CHAPTER 3 - AFFECTED ENVIRONMENT

INTRODUCTION

The purpose of this chapter is to describe the existing environment potentially affected by the alternative routes in the eastern and western portions of the project area. Resources inventoried include air quality, water, earth, biology, paleontology, land use, socioeconomics, visual, and cultural. Overviews of climate, air quality, and socioeconomics are provided in a regional context, which is more appropriate than description by alternative.

For the other resources there is a brief introduction, an overview of the project area, and a summary description for each alternative route, substation, and the microwave communication facility. The summary descriptions have been organized to provide an understanding of the key resource characteristics along each alternative by state. Maps illustrating the inventory for each resource are provided in the separately bound map volume. A reference map of the alternatives is provided in the index at the end of this document. This map has been designed as a fold-out, which allows the reader to follow the alternative route discussions in Chapters 3 and 4.

The methods employed to conduct the inventory of resources are summarized as part of the environmental process in Appendix A. A list of the agencies contacted and consulted is provided in Chapter 5 and a comprehensive list of bibliographic references is provided by resource in the section entitled References. Locational descriptions for each alternative route and photographs depicting typical conditions and key areas are provided in Appendix C. Detailed resource data supporting this DEIS are on file at Western.

KEY FOR ALTERNATIVE ROUTE DESCRIPTIONS

Several of the alternative routes in the eastern and western portions of the project area are similar; many share common links with one another. Rather than repeating information, the descriptions of the alternative routes primarily focus on the link segments that are unique to each. Diagrams illustrating each alternative route and highlighting these segments are shown on a fold-out reference key in the index at the end of the DEIS immediately following the alternatives reference map.

The alternative routes in the eastern area are discussed consistently throughout the text in the following order: GC1, K1, C1, and C2. A description of GC1 is provided for the entire length of the route in New Mexico and Arizona. Alternative route K1 is very similar to GC1; therefore, the description provided for K1 focuses on the segment of the route that differs from GC1, that is, the Kaibito Plateau area (Links 1390 and 1391). Alternative route C1 is described for its entire length. The eastern portion of alternative route C2 differs from C1. In New Mexico, the description of C2 is the same as GC1 and K1 along Links 100, 120, and 460. In Arizona, the description of C2 focuses on Link 460 near Teec Nos Pos and Link 462 in the Chinle Valley and across Carson Mesa.

The alternative routes in the western area are described in the following order—the three alternative routes that terminate at the Marketplace Substation (N1W, N2, and S2), and the three alternatives that terminate at the Mead Substation (N3, N4, and S4).

Marketplace Substation—A description of N1W is provided for the entire length of the route in Arizona and Nevada. While N1W would cross the Hualapai Reservation, N2 would cross the Aubrey Valley and Truxton Plain areas to the south; therefore, descriptions of N2 focus on Links 1742, 1800, 1980, and 2020. Alternative S2, a more southerly route, shares Links 2020, 2060, 2200, and 2180 with alternative route N2, but not Links 1420, 1421, 1480, 1520, 1640, 1680, 1720, 1960, 2000, 2002, and 2006 which are described separately.

Mead Substation—Alternative routes N3, N4, and S4 into Mead Substation are identical to alternative routes N1W, N2, and S2 into the Marketplace Substation, respectively, with the exception of the westernmost portions of the routes west of the Hualapai Valley. Links 2040 and 2080 connect into the Mead Substation, whereas Links 2060, 2200, and 2180 connect into the Marketplace Substation. Descriptions for these three alternatives into the Mead Substation focus on Links 2040 and 2080 only.

CLIMATE

The climates in northwestern New Mexico, northern Arizona, and southern Nevada are influenced by regional weather systems, elevation, and topographic orientation. The entire area is characterized by low relative humidity, a high percentage of sunshine, and relatively large annual and diurnal temperature ranges. Wind flows are driven by passage of frontal systems, but also are strongly influenced by local topography. Because of the clear, dry air, the earth's surface warms rapidly during the day and cools rapidly at night.

Average and extreme temperatures depend primarily on elevation. Temperatures in the lowest elevations in the Las Vegas and Lake Mead area average in the low 90s (Fahrenheit) in July and in the mid 40s in January. Maximum temperatures above 100 degrees are common throughout the summer season in this region. The highest elevations in the project area are in the Flagstaff area and in the Chuska Mountains near the New Mexico and Arizona border. At Flagstaff, average temperatures are in the mid 60s in July and the upper 20s in January. In northwestern New Mexico at Farmington, the temperature averages in the high 90s and low 100s in summer and in the low 30s in January.

In the lower elevations precipitation falls mostly as rain during frontal passages or during brief, but sometimes intense, summer convective thunderstorms. At higher elevations, a significant portion of the annual precipitation falls as snow in the winter and as rain during the summer thunderstorms. Average annual precipitation in the Las Vegas area is less than 4.2 inches. In the Flagstaff area, the average annual precipitation is 22.8 inches. In the Farmington area of northwestern New Mexico, average annual precipitation is 8.7 inches.

AIR QUALITY

The existing air quality along the alternative routes is characteristic of rural areas with the exception of some influence from industrial areas such as the coal-fired San Juan and Four Corners generating stations, which are located at the eastern end of the project area. The western end of the project area is south of Las Vegas, the largest population center near any of the alternatives. The northernmost alternative route, GC1, would pass the coal-fired Navajo Generating Station near Page, Arizona. In remote locations, air quality is generally very good and is affected primarily by long-range transport of pollutants from distant areas. Since much of the project area is arid with sandy or silty soils and low vegetative cover, windblown dust from natural sources contributes to local and regional suspended particulate concentrations.

The EPA has established three air quality classes. Class I is identified as an area where the cleanest and most stringent degree of protection from air quality degradation applies, and Class III is the least stringent. The closest Class I area to any alternative route is Glen Canyon NRA, which is 1.5 miles away from GC1 at its nearest point south of Page. The remainder of the project area is designated Class II. One area within the project area does not currently meet National Ambient Air Quality Standards (NAAQS). This area is located in a portion of Clark County, Nevada, which is classified as a nonattainment area for carbon monoxide and particulate matter (PM_{10}).

WATER RESOURCES

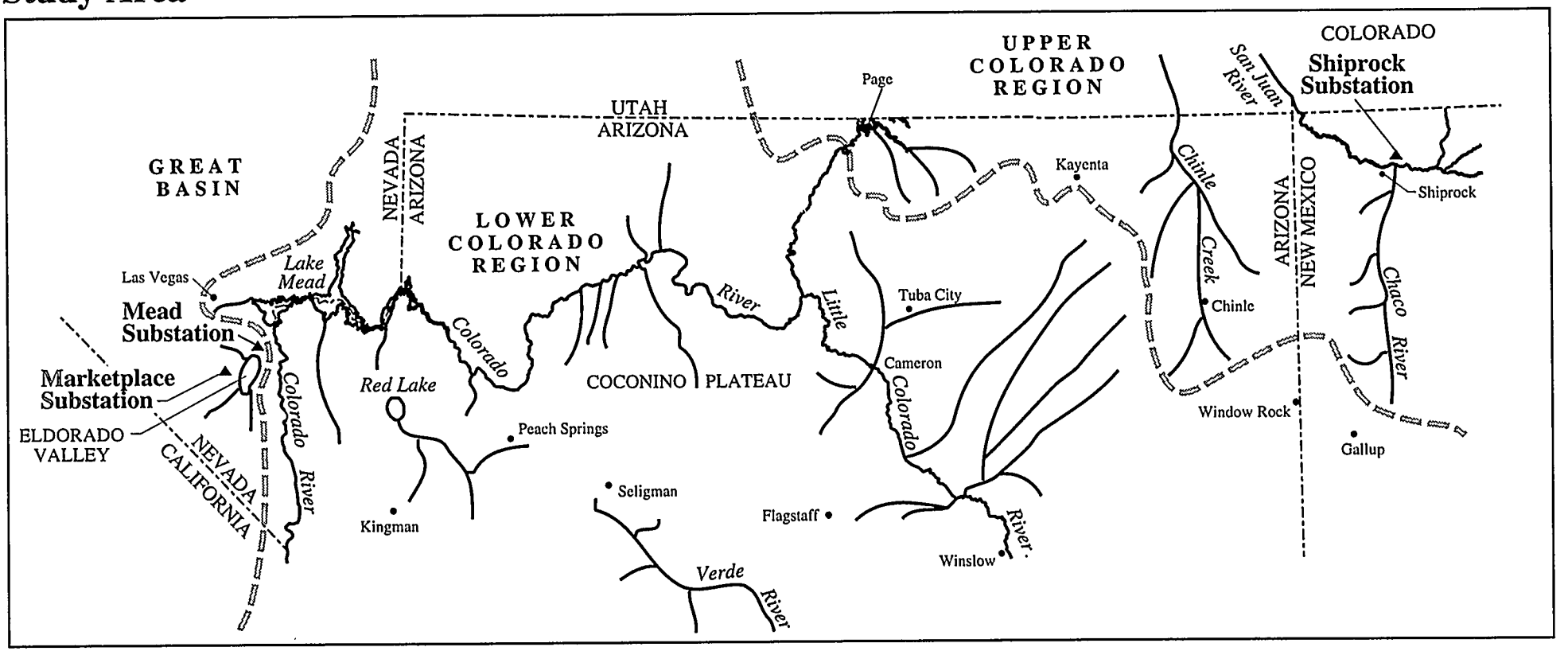
The results of the inventory are summarized below in an overview that describes hydrologic regions of the project area including perennial streams, springs, and floodplains. The overview is followed by descriptions of the water resources for alternative routes.

OVERVIEW

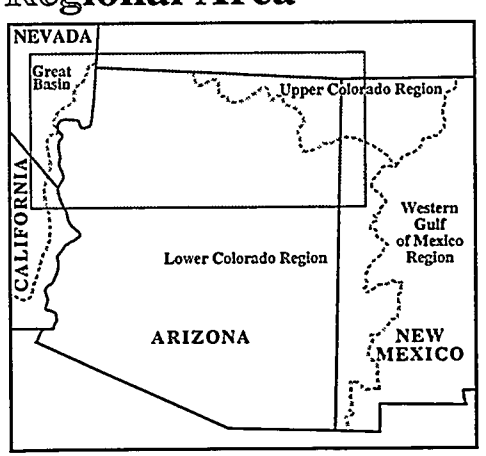
Regional Hydrology—The project area is generally arid and lies within parts of two major hydrologic regions: the Colorado River system and the Great Basin system (Figure 3-1). The Colorado River system, which includes the Upper and Lower Colorado River systems, covers a large portion of the western United States including Arizona and parts of New Mexico and Nevada. The Great Basin system consists of a network of closed drainage basins and includes most of Nevada.

Within the project area, the Upper Colorado River system includes the San Juan River watershed in northwestern New Mexico, the Chinle Creek watershed in northeastern Arizona, and several small streams in northeastern Arizona that flow northward to join the main stem of the Colorado River in Utah. The Lower Colorado River system includes the Little Colorado River watershed in northeastern Arizona and western New Mexico, the northern part of the Verde River watershed and several small streams on the Coconino Plateau in north-central Arizona, and the main stem of the Colorado River at the Arizona and Nevada border. The Great Basin system includes most of the Nevada portion of the project area and is represented by the Eldorado Valley, a closed basin that drains into a normally dry playa near the western edge of the project area.

Study Area



Regional Area



Hydrologic Regions

Navajo Transmission Project

Figure 3-1

The project area includes portions of the Plateau Uplands (northwestern New Mexico and northern Arizona) and the Basin and Range (western Arizona and southern Nevada) water provinces. In the Plateau Uplands Province, ground-water development (e.g., wells) has been fairly minimal because of excessive depths to ground water. Depth to ground-water is variable throughout the area ranging from about 20 feet along some major surface water drainages (such as Chinle Creek) to more than 200 to 300 feet throughout most of the region. In the Basin and Range Province, depth to ground water from the surface ranges from a few feet near major perennial drainages to more than several hundred feet in portions of the alluvial basins in western Arizona and southeastern Nevada.

Perennial Streams—The only major perennial streams within the project area, as shown on Figures MV-1E and MV-1W, are the San Juan and Colorado rivers. In the eastern area, several minor spring-fed perennial streams drain the Chuska and Carrizo mountains. Minor perennial streams also are found in the northern portion (primarily northwestern New Mexico and northeastern Arizona) of the project area and drain the west side of the Defiance Plateau. Major ephemeral streams include the Chaco and Little Colorado rivers. Major ephemeral streams and washes have been identified and mapped throughout the project area.

Floodplains—Areas of potential flooding (including 100-year floodplains) occur along most of the major stream courses (e.g., perennial streams and tributaries). Project alternative routes would cross floodplain areas ranging in width from 0.1 mile to 1.4 miles. Areas prone to significant flash flooding include larger intermittent or ephemeral drainages throughout the project area. The larger floodplains have been mapped within a one-mile-wide corridor (one-half mile on either side of the reference centerline) as shown in Figures MV-1E and MV-1W in the map volume.

Springs—Springs occur throughout the project area, but are more concentrated in the eastern area (northwestern New Mexico and northeastern Arizona). The springs are located along stream courses, and some of these springs contribute flow to perennial streams. Although springs along the alternative routes are mapped within a one-mile-wide corridor as shown in Figures MV-1E and MV-1W, only those springs within 600 feet of the reference centerline are reported here.

ALTERNATIVES

The water resources inventory results summarized below include a description of perennial streams, floodplains, and springs.

Eastern Area Transmission Line Alternatives

Glen Canyon 1 (GC1)

New Mexico

GC1 crosses the San Juan River, a perennial stream and an area of potential flooding, on Link 460. Links 100 and 460 cross small floodplain areas associated with ephemeral drainages (e.g., Salt Creek) that are typically 0.1 to 0.2 mile wide. There are no springs within 600 feet of the reference centerline of GC1.

Arizona

Link 461 crosses Chinle Creek near areas of perennial flow and there are two springs along Link 461 that are within 600 feet of the reference centerline. Links 460, 461, 580, 581, 586, 587, 620, 1383, and 1386 cross several ephemeral drainages and small areas of 100-year floodplains; the crossings are typically 0.1 to 0.2 mile wide.

Kaibito 1 (K1)

New Mexico

The New Mexico portion of K1 is the same as GC1.

Arizona

The Arizona portion of K1 is the same as GC1 except for the use of Links 1390 and 1391 across the Kaibito Plateau (which replace Links 587, 620, 621, 627, and 1389 on GC1). No perennial streams or floodplains would be crossed in this area. One spring along Link 1390 is within 600 feet of the reference centerline of K1 near Choal Canyon.

Central 1 (C1)

New Mexico

C1 crosses the San Juan River, a perennial stream and an area of potential flooding, on Link 240. Floodplain crossings are 0.1 to 0.2 mile wide. There are no springs along this portion of C1.

Arizona

C1 crosses several areas of broad floodplain at Lukachukai Wash and Chinle Wash (Link 700); and Oraibi Wash, Dinnebito Wash, and the Little Colorado River (Link 780). Other crossings of ephemeral drainages are about 0.1 to 0.2 mile wide. There are three springs along Link 700 and two springs along Link 780 that are within 600 feet of the reference centerline of alternative C1.

Central 2 (C2)

New Mexico

The New Mexico portion of C2 is the same as GC1 and K1.

Arizona

The Arizona portion of C2 varies from C1 by passing to the north and west of the Chuska Mountains along Link 460 near Teec Nos Pos and Link 462 in the Chinle Valley and across Carson Mesa. The portion of C2 from the Lohali Mesa area west to the Moenkopi Substation along Link 780 is the same as C1. No perennial streams would be crossed in this area. One broad floodplain would be crossed near the convergence of Chinle Wash and Lukachukai Wash on Link 462. There are no springs within 600 feet of the reference centerline in this area.

Substation Alternatives

No water resource issues were identified at any of the substation sites.

Western Area Transmission Line Alternatives - Moenkopi to Marketplace

Northern 1 West (N1W)

Arizona

N1W crosses the Colorado River, a perennial river with a broad floodplain along Link 2060. There are crossings of other floodplains along Red Horse Wash (Links 1401 and 1660), at Detrital Wash (Link 2060), near Red Lake (Link 2060), and at Miller Wash (Link 1660). One spring located north of Peach Springs along Link 1790 is located within 600 feet of the reference centerline.

Nevada

N1W crosses the Colorado River along Link 2060. Broad floodplains would be crossed at tributaries to Dry Lake in the Eldorado Valley along Link 2200. No springs were identified along this alternative.

Northern 2 (N2)

Arizona

The Arizona portion of N2 is the same as N1W with the exception of Links 1742, 1800, 1980, and 2020, which are located to the south of the Hualapai Indian Reservation and replace Link 1790 on N1W. Link 1980 crosses floodplain areas in the Truxton Wash and this route is adjacent to Red Lake on Link 2020. No springs were identified within 600 feet of the reference centerline of this alternative.

Nevada

The Nevada portion of N2 is the same as N1W.

Southern 2 (S2)

Arizona

In Arizona, S2 varies from N2 beginning at the Moenkopi Substation and continuing west through Link 2006. At this point, S2 is then the same as N2 proceeding north and west along Links 2020 and 2060 to the crossing of the Colorado River and the Nevada border. This portion of S2 crosses broad floodplains along a tributary to Partridge Creek (Link 1680), at Hackberry Wash (Link 2000), and at Truxton Wash (Link 2006). No springs are within 600 feet of the reference centerline of this alternative.

Nevada

The Nevada portion of S2 is the same as N1W and N2.

Western Area Transmission Line Alternatives - Moenkopi to Mead

Northern 3 (N3), Northern 4 (N4), and Southern 4 (S4)

Alternatives N3, N4, and S4 are identical to alternatives N1W, N2, and S2, respectively, with the exception of Links 2040 and 2080, which connect into the Mead Substation rather than the Marketplace Substation (replacing Links 2060, 2200, and 2180). The following description focuses on Links 2040 and 2080.

Arizona and Nevada

Link 2040 crosses the Colorado River in a canyon setting in Arizona and Nevada. The Detrital Wash, a broad floodplain, is crossed by Link 2040 in Arizona. No springs were identified along Links 2040 and 2080.

Substation Alternatives and Microwave Communication Facility

No water resource issues were identified at any of the substation sites or at the communication site.

EARTH RESOURCES

The inventory of earth resources is summarized below in an overview that describes the geology, soils and erosion potential, mineral resources, seismicity and faults, and unique geologic features. The overview is followed by descriptions of the alternative substation sites, and the communication facility.

OVERVIEW

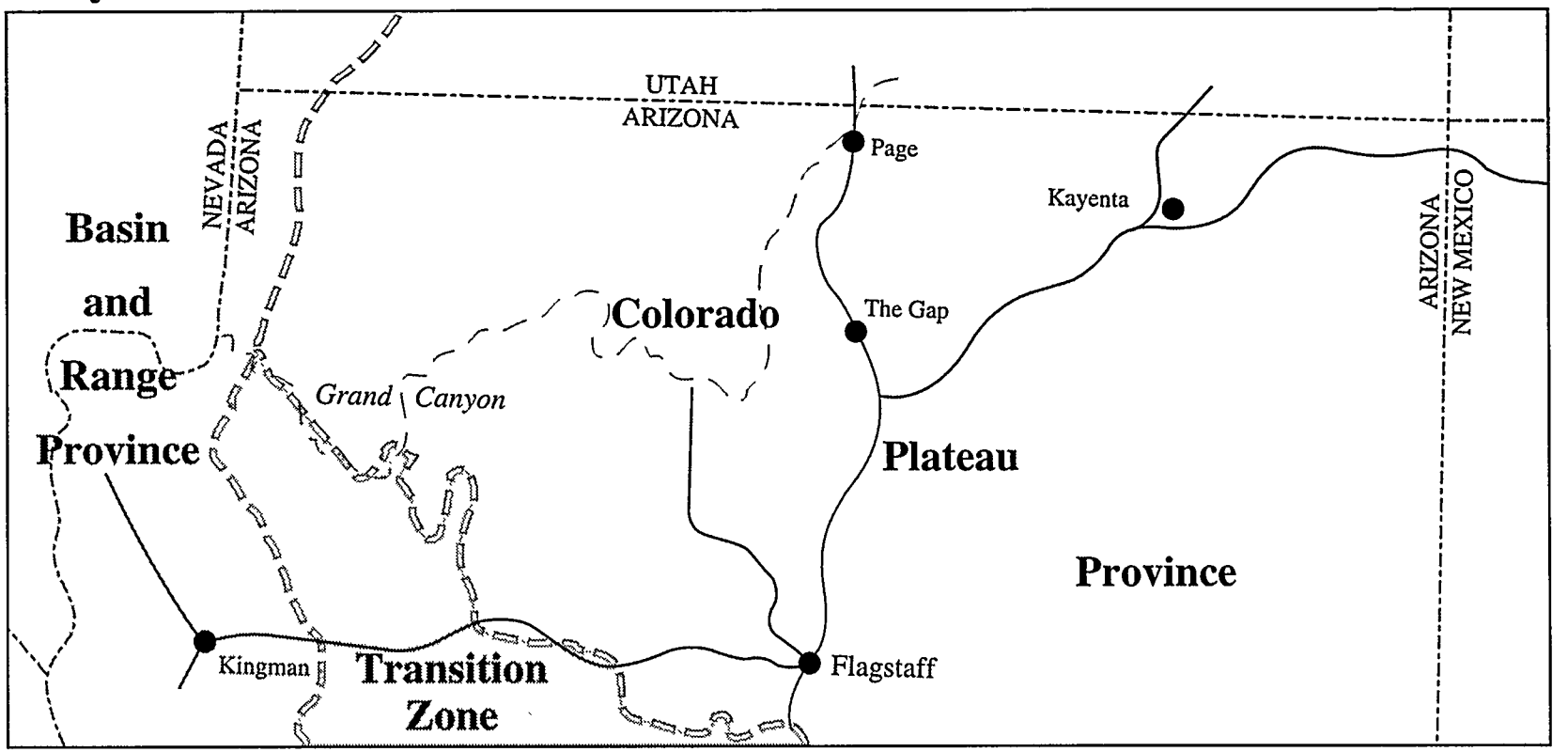
Geology—The project area includes portions of three physiographic provinces: the Colorado Plateau, the Transition Zone, and the Basin and Range, as shown in Figure 3-2. The Colorado Plateau includes northwestern New Mexico, as well as most of northern and northeastern Arizona. It is characterized by generally flat-lying sedimentary strata divided by faults and monoclines that form cliffs and individual plateaus. Mesas and buttes are common, capped by erosion-resistant rock layers. Volcanoes and extensive lava flows also are common. The western edge of the Colorado Plateau in Arizona is defined by the Aubrey Cliffs, part of the Mogollon Escarpment (Peirce 1984).

The Transition Zone is a 50- to 150-mile-wide northwest- to southeast-trending band across Arizona that separates the Colorado Plateau from the Basin and Range. The Transition Zone is characterized by northwest-southeast trending, subparallel, fault-bordered mountains separated by alluvial-filled valleys, as well as exposed flat-lying sedimentary rocks. The Transition Zone is bounded on the west by the Grand Wash Cliffs, which were formed by the Grand Wash Fault (Peirce 1985).

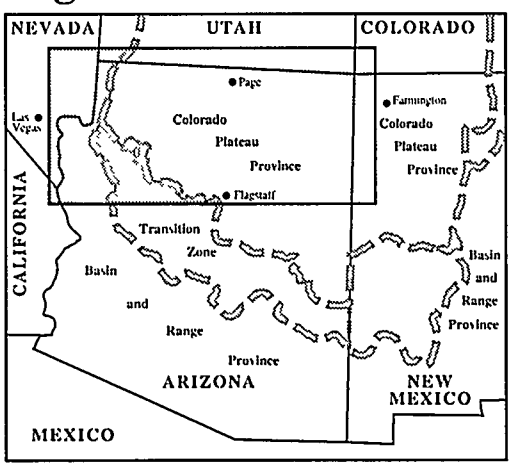
The Basin and Range Physiographic Province includes southern New Mexico, southern and western Arizona, and Nevada. The province is characterized by steep, discontinuous, subparallel mountain ranges separated by broad, alluvial-filled valleys. In Arizona and southern Nevada, these fault-bounded mountain ranges typically trend northwest-southeast or north-south.

Mineral Resources—Mineral resources of economic importance (e.g., resources that have currently or recently been mined) in the eastern area include coal, oil, natural gas, uranium, industrial rock (gypsum, clay, sand and gravel, crushed stone, bentonite), helium, and vanadium. In the western area, mineral

Study Area



Regional Area



N

Physiographic Provinces

Navajo Transmission Project

Figure 3-2

resources include metals (gold, lead, silver, zinc, mercury), salt, rock (cinder, flagstone, sand and gravel, dolomite, limestone), uranium, thorium, and beryllium. None of the alternative routes would cross through active mining operations.

Seismicity and Faults—Seismic activity in the New Mexico portion of the Colorado Plateau primarily occurs in the area surrounding the San Juan Basin. Recorded earthquake magnitudes generally have been less than 4.0 on the Richter scale.

Historic earthquake activity in northern Arizona has occurred at the Grand Canyon, in Big Chino Valley north of Prescott, and in the San Francisco Volcanic Field around the city of Flagstaff to the Utah border. Several Quaternary faults have been mapped along the Colorado River in the Arizona and Nevada portions of the project area. Earthquake magnitudes along the Colorado River are generally less than 5.0 (Nakata et al. 1982). Faults showing movement during the Quaternary period include the Grand Wash Fault and the Aubrey Fault (Schell and Wilson 1981). A Maximum Magnitude Earthquake of Richter magnitude 6.1 to 7.3 has been identified for the Arizona portions of the project area (Algermissen et al. 1982; DuBois et al. 1982).

Unique Geologic Features—Although there are many areas of spectacular beauty and geologic interest, there are no designated national natural landmarks along alternative routes in the project area. Geologic features in the project area making visual and/or cultural significance are discussed as part of those resources.

Soils and Erosion Potential—The soils throughout the project area are quite variable because of different climates, parent materials, topography, and other factors affecting the formation of soils. On the Colorado Plateau, broad areas are subject to high wind and water erosion because of sparse vegetation cover and soil type. The soils on plateaus, mesas, hillsides, and fan terraces range from very shallow (a few inches) to deep (greater than five feet) and are generally well drained. In these areas, the water erosion potential is typically slight to moderate, while wind erosion potential is often moderate to severe. In several broad volcanic portions of the Colorado Plateau, many of the soils have formed in basalt and pyroclastics and are very cindery. The erosion potential in these areas is usually slight to moderate, but may be high in areas with steeper slopes and severe in a few areas.

In the Transition Zone and Basin and Range Province, the soils in the valleys have generally formed from mixed alluvium. The soils range from very shallow to deep and are typically gravelly, sandy, or loamy with caliche in the subsurface. The erosion potential is slight to moderate and typically increases with greater slope. In floodplains, terraces, and alluvial fans in the Colorado River area, the soils have formed in alluvium derived from igneous and sedimentary rocks. These deep soils are sandy, loamy, or gravelly on the surface. Caliche is typical in the subsurface of soils developed on the terraces and alluvial fans. The erosion potentials are again slight to moderate, increasing with greater slope. Some broad areas are subject to high or severe wind erosion.

ALTERNATIVES

The results of the earth resources inventory are summarized below for each alternative route, substation, and the communication site. Figures MV-2E and MV-2W illustrate soil associations and erosion potential, mapped within a one-mile-wide corridor.

Eastern Area Transmission Line Alternatives

Glen Canyon 1 (GC1)

New Mexico

Soils along GC1 in New Mexico are typically loams and clay loams with moderate to high water erosion potential and/or high to severe wind erosion potential along Links 100, 120, and 460. Badlands are common in the region. Link 460 crosses a portion of the Shiprock uranium district.

Arizona

The soils associated with this portion of the alternative are typically loamy, clayey, or sandy soils. High to severe wind and/or water erosion potentials are evident in broad areas. Erosion potential of the soils along this alternative are generally high to severe and moderate to high except for portions of Links 460 and 461 near Red Mesa and Links 463 and 501 near Dennehotso, where the erosion potentials are slight and slight-moderate; and small sections of Links 581, 586, 587, 1393, 1397, and 1383 where there is low or no erosion potential. Links 504 and 561 have very steep and rocky areas along Black Mesa. Badlands are common in various locations. Links 1383, 1384, and 1386 would cross a portion of the Painted Desert between The Gap and Cameron.

To the north of the Carrizo Mountains, Link 460 crosses over or adjacent to Twin Falls Creek, Teec Nos Pos, the Bita Peak oil and gas fields, and the Black Rock Point uranium district. Near Red Mesa, Link 461 crosses a portion of the East Boundary Butte oil field. At Black Mesa, Links 504 and 561 are to the north of the Kayenta and Black Mesa coal mines. Links 587 and 1389 are adjacent to the White Mesa mining district northeast of Copper Mine and Links 1384 and 1386 are adjacent to the Cameron uranium district.

Kaibito 1 (K1)

New Mexico

The New Mexico portion of K1 is the same as GC1.

Arizona

The Arizona portion of K1 is the same as GC1 except for the use of Links 1390 and 1391 across the Kaibito Plateau (which replace Links 587, 620, 621, 627, and 1389 on GC1). The majority of the soils along this section of alternative route K1 consist of sand dunes or rock outcrops with sparse vegetation. Wind erosion potential is severe and water erosion potential is slight. Link 1390 is adjacent to the southern part of the White Mesa mining district.

Central 1 (C1)

New Mexico

The soils in the area are typically loamy, sandy, or clayey soils with high to severe wind and/or water erosion potential. Only a small segment of Link 240 near the San Juan River has a slight-moderate erosion potential. Badlands are common in the region. Link 640 crosses through The Hogback, a prominent geologic feature of the area.

Near Fruitland, Links 180, 240, 300, 360, and 640 cross through or adjacent to a portion of the Navajo, Fruitland, and Hogback coal fields. The San Juan Coal Mine is located north of the town of Fruitland and east of Link 240. The Navajo Coal Mine is located southwest of Fruitland southeast of Links 300 and 360. Link 640 crosses through a portion of the Chuska uranium district. Oil and gas fields are located near Link 640 in the vicinity of The Hogback and along Link 700 near the Chuska Mountains.

Arizona

Links 700 and 701 generally cross sandy, loamy, clayey, and stony soils. The erosion potential varies from slight, to moderate-high, and high-severe in the Chuska Mountains (Link 700) and Ventana Mesa (Link 701 and part of 700), and from slight to slight-moderate in the Chinle Valley and areas north of Canyon de Chelly and west of Lukachukai. Link 780 generally crosses sandy loams, fine sands, loams, and rock outcrop. The erosion potential of the soils along Link 780 are predominantly high-severe with several broad areas of moderate potential in some of the major drainages. There are large areas of badlands, and the western portion of Link 780 crosses a part of the Painted Desert.

Link 700 crosses the Dineh-Bi-Keyah oil field in the Chuska Mountains, and is adjacent to the Red Rock (near Red Valley), Lukachukai (in the Chuska Mountains), and Chinle (north of Canyon de Chelly) uranium districts. The western portion of Link 780 crosses the Cameron uranium district.

Central 2 (C2)

New Mexico

The New Mexico portion of C2 is the same as GC1 and K1.

Arizona

The Arizona portion of C2 varies from C1 by passing to the north and west of the Chuska Mountains along Link 460 near Teec Nos Pos and Link 462 in the Chinle Valley and across Carson Mesa. The portion of C2 from the Lohali Mesa area west to the Moenkopi Substation along Link 780 is the same as C1. The soils along Link 460 are generally sands, clay loams, and sandy loams with slight or moderate-high erosion potential. Areas of high-severe erosion occur in part in the Walker Creek drainage and on Carson Mesa south of Rock Point (Link 462).

C2 crosses through or adjacent to the Twin Falls, Bita Peak, and Teec Nos Pos oil and gas fields as well as the Black Rock Point uranium district to the north of the Carrizo Mountains, and would cross the Dry Mesa and Black Rock oil fields located to the northwest of the Carrizo Mountains. Near the town of Rough Rock, C2 is adjacent to the Black Mountain uranium district and the Rough Rock uranium district, which includes breccia pipes with copper (Link 462).

Substation Alternatives

Shiprock Substation—At the existing Shiprock Substation, the soils consist of clay loams with moderate-severe wind erosion potential and moderate water erosion potential. Coal resources are abundant in the area.

Honey Draw Substation Site—At the Honey Draw Substation site, the soils in the area include loamy sands and fine sands, which have a severe wind erosion potential and a slight water erosion potential.

Red Mesa Substation Site—In the area of the Red Mesa Substation site, the soils consist of loamy sands and fine sands, which have a severe wind erosion potential and a slight water erosion potential.

Copper Mine Substation Site—The Copper Mine Substation site is located in an area consisting primarily of rock outcrop and shallow soils, low or no soil erosion is expected.

Moenkopi Substation—In the area of the existing Moenkopi Substation, the soils consist of sandy or clayey loams. The wind erosion potential is severe, and the water erosion potential is slight. The site is adjacent to the Cameron uranium district.

Western Area Transmission Line Alternatives - Moenkopi to Marketplace

Northern 1 West (N1W)

Arizona

The soils in the area of N1W include limey gravelly loams, sandy loams, clay loams, gravels, and cinders, with predominantly slight to moderate erosion potential. The Aubrey Valley and Peach Springs area (Link 1790) has some moderate-high and high-severe potential for erosion. Near Moenkopi, the soils

also have a high-severe erosion potential. Other limited areas with high-severe erosion potential include portions of the Music Mountains (Link 1790), the White Hills, Detrital Valley, and the Black Mountains (Link 2060).

Link 1400 is adjacent to the Cameron uranium district. Link 1660 crosses near the Francis and Valle uranium districts, and there are known manganese deposits in an area near the Aubrey Cliffs. There are known deposits of gold and tungsten in the Music Mountains near Link 1790, and gold, copper, and silver deposits along Link 2060 in the White Hills and Black Mountains. Active mines in the area include the Outland Resources Shipley Pit northwest of Links 1740 and 1741.

Nevada

The soils along this portion of N1W are typically extremely cobbly to very gravelly, loamy, or sandy. The erosion potential is mostly moderate throughout the area along Links 2060 and 2200 with high-severe erosion potential at the crossing of the Colorado River on Link 2060. Link 2060 crosses part of the Eldorado mining district with known deposits of gold, silver, lead, zinc, copper, mercury, uranium, thorium, and beryllium.

Northern 2 (N2)

Arizona

The Arizona portion of N2 is the same as N1W with the exception of Links 1742, 1800, 1980, and 2020, which are located to the south of the Hualapai Indian Reservation and replace Link 1790 on N1W. This segment of N2 has high-severe erosion potential areas in the Hualapai Valley and Truxton Wash areas (Links 2020 and 1980). Active mines in the area include the Nelson Quarry north and west of Link 1742, and Outland Resources Shipley Pit northwest of Link 1742.

Nevada

The Nevada portion of N2 is the same as N1W.

Southern 2 (S2)

Arizona

In Arizona, S2 varies from N2 beginning at the Moenkopi Substation and continuing west through Link 2006. At this point, S2 is then the same as N2 proceeding north and west along Links 2020 and 2060 to the crossing of the Colorado River and the Nevada border. Unique portions of this route are characterized by soils that are generally gravelly loams or cindery, clayey, or sandy soils. The erosion potential is typically slight or slight-moderate across the alternative. Areas with moderate-high erosion occur in Big

Chino Valley (Link 1720), and areas with high-severe erosion potential are primarily located along Link 1420 southwest of the Moenkopi Substation and north of Hackberry (Link 2006). Near Cameron, Link 1420 is adjacent to the Cameron uranium district. Gold is known to be present in portions of the Cottonwood Mountains; and lead, zinc, and silver in the Peacock Mountains near Hackberry.

Nevada

The Nevada portion of S2 is the same as N1W and N2.

Western Area Transmission Line Alternatives - Moenkopi to Mead

Northern 3 (N3), Northern 4 (N4), and Southern 4 (S4)

Alternatives N3, N4, and S4 are identical to alternatives N1W, N2, and S2, respectively, with the exception of Links 2040 and 2080, which connect into the Mead Substation rather than the Marketplace Substation (replacing Links 2060, 2200, and 2180). The following description focuses on Links 2040 and 2080.

Arizona and Nevada

Soils along Link 2040 in Arizona are generally sandy loams, gravelly loams, loamy sands, and loams, with slight to moderate erosion potential. At the Colorado River crossing and into Nevada (Links 2040 and 2080), the mountainous areas are characterized by very cobbly loams to very gravelly loams and steep rock outcrops with erosion potential ranging from moderate to high and severe.

There are known deposits of gold, copper, and silver along Link 2040 in the White Hills and Black Mountains in Arizona.

Substation Alternatives

Red Lake Substation Site—Soils in the area include gravelly or cindery loams. The water erosion potential is moderate and the wind erosion potential is slight.

Marketplace Substation—Soils in the area are sandy loams. Erosion potential is slight to moderate.

Mead Substation—Soils in the area of the existing Mead Substation are gravelly, sandy, and loamy with high-severe erosion potentials.

Microwave Communication Facility

The existing Bill Williams Mountain communication site is located on an inactive cinder cone volcano. The ground's surface is cindery, and erosion potential increases with greater slope, ranging from slight to moderate.

BIOLOGICAL RESOURCES

The results of the inventory are summarized below in an overview that describes vegetation types, wildlife, and special status species. The inventory was completed from available data with a field survey conducted only in The Hogback ACEC for special status plants. In the absence of special status species data for much of the area, habitat suitable for supporting such species was identified to predict the presence of special status plant and wildlife species. This information is intended as a guideline for areas that may require biological resources surveys prior to construction.

OVERVIEW

Vegetation Types—There are eight major vegetation types present within the project area (Table 3-1, Figures MV-3E and MV-3W) (Brown et al. 1979). Great Basin desertscrub, Great Basin/Plains grasslands, and Great Basin conifer woodlands (e.g., piñon-juniper woodlands) occur as ecotones throughout much of the New Mexico and eastern Arizona portions of the project area. The Rocky Mountain montane conifer forest (e.g., ponderosa pine), and mixed conifer forests (e.g., spruce-fir) are limited to the Chuska Mountains along the New Mexico and Arizona border. While no well-developed mixed conifer forests are present along the alternative routes, individual elements (e.g., Douglas fir) are present locally at higher elevations. Grasslands characterize the valleys of central Arizona (e.g., Aubrey and Hualapai valleys), and Great Basin conifer woodlands occur at higher elevations. Western Arizona and Nevada are characterized primarily by Mohave desertscrub. Riparian and broadleaf communities exist along permanent and ephemeral streams (e.g., San Juan, Colorado, and Little Colorado rivers) at all elevations within the project area. Wetlands are limited, occurring at springs or in association with other permanent water bodies. Sand dune scrub is limited to one area west of Cameron and north of Hackberry, Arizona. Miles of vegetation types found along each of the eastern and western alternative routes are presented in Table 3-2.

Wildlife—There are approximately 473 species of vertebrates within the project area, including 95 species of mammals, 268 species of birds, 71 species of reptiles and amphibians, and 39 species of fish. While some animals, like the coyote, are highly adaptive and can live in a variety of habitats, many others are characteristic of particular vegetation types. Some wildlife species are migratory, meaning that they reside within the project area for only a portion of the year (e.g., raptors), or that they use different habitats seasonally within the project area (e.g., big game). Characteristic species within various habitat types are presented in Table 3-1.

TABLE 3-1
BIOTIC COMMUNITIES
Vegetation Types and Representative Wildlife and Plant Species

Vegetation Type	Elevation (feet)	Plants and/or Series	Representative Wildlife
Great Basin Desertscrub (AZ, NM)	5,000 to 8,000	sagebrush series, shadscale series, blackbrush series	pronghorn, sagebrush vole, dark kangaroo mouse, sage thrasher, sage sparrow, spadefoot toad, sagebrush lizard
Great Basin/Plains Grasslands (AZ, NM)	4,500 to 7,500	blue grama, galleta, Indian ricegrass, snake-weed, rabbitbrush, winterfat, four-wing saltbush, juniper	pronghorn, Gunnison's prairie dog, spotted ground squirrel, horned lark, meadowlark, great plains toad, lesser earless lizard, western rattlesnake
Great Basin Conifer Woodland (AZ, NM)	4,500 to 8,000	piñon pine, one-seeded juniper, big sagebrush, boxthorn, snakeweed, Mormon tea, Spanish bayonet	mule deer, elk, piñon mouse, Stephen's woodrat, red spotted toad, plateau whiptail, night snake
Rocky Mountain Montane Conifer Forest (AZ, NM [Chuska Mountains])	6,000 to 8,000	ponderosa pine, Douglas fir, gambel oak, aspen, white fir, limber pine	black bear, mule deer, turkey, Nuttall's cottontail, Abert's squirrel, dwarf shrew, tiger salamander, ringneck snake
Rocky Mountain Montane Conifer Forest - Mixed Conifer Forest (AZ, NM, Chuska Mountains)	6,500	Douglas fir, aspen white fir, limber pine	black bear, mule deer, turkey, Abert's squirrel, dwarf shrew
Riparian Woodlands: Plains/Great Basin Grasslands (AZ, NM)	4,500 to 7,500	plains and narrow-leaf cottonwoods, rushes, sedges, cattails, tamarisk, camelthorn, Russian olive	raccoons, beavers, numerous songbirds
Riparian Woodlands: Montane Habitats (AZ, NM [Chuska Mountains])	>6,000	Texas mulberry, Arizona alder, narrowleaf cottonwood, boxelder, Rocky Mountain maple, sedges, flat sedges, bulrushes	raccoons, beavers
Mohave Desertscrub (NV, AZ)	2,500 to 5,000	creosotebush-bursage series, saltbush-greasewood series, Joshua tree-blackbrush series	desert bighorn sheep, gray fox, kit fox, red-tailed hawk, prairie falcon, Gila monster, chuckwalla, desert tortoise

1. Complete species lists are on file as part of the biological resources data supporting this DEIS.
2. Sensitivity levels assigned to biological resources are provided in Table D-4.

TABLE 3-2
MILES OF VEGETATION TYPES ALONG THE ALTERNATIVE ROUTES

Alt.	Total Miles	Vegetation Type						
		MDS	GBDS	GBPGL	GBCW	PP	SDS	R/W
Eastern Alternative Routes								
GC1	260.6	-	177.9	48.2	30.7	-	-	3.4/0.1
K1	244.7	-	164.7	43.8	32.5	-	-	3.3/0.1
C1	186.7	-	50.7	99.9	26.5	6.8	-	1.8/0.1
C2	211.0	-	99.7	91.2	18.4	-	-	1.6/0.1
Western Alternative Routes								
N1W	217.0	74.2	5.1	86.2	49.3	-	0.2	1.0/1.0
N2	225.1	88.2	5.1	95.7	32.2	-	0.2	1.0/1.0
S2	247.7	84.6	4.2	92.0	58.9	-	4.6	2.2/0.1
N3	199.3	55.2	5.1	86.2	49.3	-	0.2	2.3/1.0
N4	207.4	69.2	5.1	95.7	32.2	-	0.2	2.3/1.0
S4	230.0	65.6	4.2	92.0	58.9	-	4.6	3.5/0.1

KEY:
MDS = Mohave Desertscrub
GBDS = Great Basin Desertscrub
GBPGL = Great Basin/Plains Grasslands
GBCW = Great Basin Conifer Woodlands
PP = Rocky Mountain Montane Conifer Forest (Ponderosa Pine Forests)
SDS = Sand Dune Scrub
R/W = Riparian/Wetlands

Mammals—Mammals within the project area include 20 species of bats, 4 lagomorphs, 3 insectivores, 16 carnivores, 7 hoofed mammals, and 45 rodents.

Suitable habitat exists within the project area for several big game species, including mule deer, which range from desertscrub and grassland to coniferous forests (Burt and Grossenheider 1976). Crucial winter habitat for mule deer exists near the New Mexico and Arizona border. Pronghorn are most prevalent in rolling or dissected hills and mesas with grasses and scattered shrubs (e.g., Aubrey Valley) (Hoffmeister 1986). Elk inhabit the Chuska Mountains and Gray Mountain on the Navajo Nation, and Blue Mountain, Red Tank, and Milkweed Canyon on the Hualapai Indian Reservation. Bighorn sheep are found in the Black Mountains of Arizona and the Eldorado Mountains of Nevada. Black bears inhabit the Chuska Mountains. Mountain lions prefer rocky or mountainous areas (e.g., The Hogback, Chuska Mountains, and Eldorado Mountains) where mule deer provide the main prey base (Whitaker 1980).

Small game and furbearers within the project area are diverse and include red fox, kit fox, gray fox, bobcats, and coyotes. Raccoons are typically found near permanent water bodies, while ringtails live in

rocky canyons near cliffs. Gunnison's prairie dog inhabit grassland and are present in the Aubrey Valley. Western spotted, striped, and hog-nosed skunks; badgers; and Abert's tree squirrels inhabit ponderosa pine forests in the Chuska Mountains. Beavers exist along the San Juan River and on mountain streams in the Chuska Mountains, where aspen groves are prevalent. Other small mammals within the project area include rabbits, hares, shrews, and bats.

Populations of wild horses and burros exist on the Hualapai Reservation (Link 1790). Burros, which are protected by law, may be present in the Black Mountains of Arizona (Links 2040 and 2060). Burros also are present in the Eldorado Mountains of Nevada. A BLM herd management area extends to the Lake Mead NRA (Slone 1994).

Birds—Approximately 268 bird species may occur in the various habitats within the project area as wintering species, migrants, or permanent or summer-breeding residents. Several species of upland game birds are present within the project area. Wild turkeys inhabit high elevation montane conifer forests; band-tailed pigeons inhabit higher elevation oak woodlands; ring-necked pheasant, scaled quail, and mourning dove are open grassland species; Gambel's quail inhabit Mohave desertscrub; and white-winged doves summer along the Colorado River in western Arizona. Waterfowl including geese, ducks, and coots are found in the mountain and foothill lakes of the Chuska Mountains, along the Colorado River and its lakes, and at ponds and stock tanks. Many of these species are transients and use the San Juan and Colorado river corridors during migration, as well as ponds and lakes in the Chuska Mountains. All birds are protected by the Migratory Bird Treaty Act (MBTA), except house sparrows and starlings.

Suitable habitat for a number of raptor species exists within the project area. The red-tailed hawk is a year-round resident throughout the project area. Ferruginous hawks are permanent or winter residents throughout the project area and nest in badlands. Swainson and ferruginous hawks are known to nest in the Hualapai Valley. Peregrine falcons nest in steep cliffs near an abundant prey base, which are present along several alternative routes. Golden eagles inhabit sites (i.e., a large tree or cliff) where open expanses of land support a dependable prey base. Bald eagles migrate through the area, using the lakes and ponds in the Chuska Mountains and Defiance Plateau. They winter along the San Juan and Colorado rivers, and nest in riparian areas along perennial streams. Other raptors include the northern goshawk, northern harrier, prairie falcon, merlin, osprey, and turkey vulture. The great horned and western screech owls are found throughout the project area. The barn owl, flammulated owl, northern pygmy-owl, and northern saw-whet owl are found at higher elevations. The long-eared owl prefers riparian areas. Burrowing owls nest on the ground in open areas. Mexican spotted owls, a listed species, nest and forage throughout the Chuska Mountains which have been designated as critical habitat.

Reptiles and Amphibians—There are 71 species of reptiles and amphibians within the project area—1 salamander, 7 toads, 7 frogs, 1 turtle, 1 tortoise, 27 lizards, and 27 snakes. Although the amphibians and some of the reptiles are highly water-dependent, some of the terrestrial reptiles, including the horned lizards and several snake species, inhabit very arid areas. Populations of Sonoran and Mohave desert tortoises are present in Arizona and Nevada, respectively. Chuckwallas and Gila monsters are found in rocky areas within Mohave desertscrub. Historic records of chuckwalla exist from the vicinity of Page. The Arizona toad occupies Milkweed Canyon on the Hualapai Reservation.

Fishes—Fish species in the project area are associated with perennial waters, predominantly the rivers and lakes of the Colorado River system, and streams and lakes in the Chuska Mountains. Important components of this system are Lake Mohave, the Colorado and Little Colorado rivers, and the San Juan River. Ten species of fish are native to the project area and 28 have been introduced. The native species include speckled dace, bonytail chub, roundtail chub, humpback chub, Little Colorado River spinedace, Colorado squawfish, razorback sucker, flannelmouth sucker, white sucker, and bluehead mountain-sucker. Perennial streams within the Chuska Mountains, including Lukachukai Creek, also support fish populations.

Cold water sport fishes include rainbow, Arizona cutthroat, brown, and brook trout. Warm water sport fishes include northern pike, walleye; striped, smallmouth and largemouth bass; white and black crappie; green sunfish; bluegill; redear sunfish; blue and channel catfish; and yellow and black bullhead.

Special Status Species—The FWS, Navajo Nation, BLM, Forest Service, and the states of New Mexico, Nevada, and Arizona have devised codes for defining the extent of rarity and level of threat to biotic taxa. Definitions for the categorical ratings (e.g., endangered, threatened) are provided in Table D-1. Special status species are summarized by state in Table D-2. Detailed accounts of species with status at the Federal level are presented in the NTP biological resources data supporting this DEIS.

The FWS offices in Albuquerque, Phoenix, and Las Vegas provided regional lists of special status species. Information on specific locations of such species was provided by land-managing agencies when available; however, these data were limited. Wherever possible, known locations of special status plant and wildlife species were mapped. Specific locations of certain species (e.g., raptor nests) were not mapped due to the sensitive nature of this information.

The Federal, tribal, and state lists of species included 59 special status plant species and more than 100 special status wildlife species. Due to the distances covered by the eastern and western alternative routes, each of the alternative routes traverses a similar, wide diversity of habitat types. Habitat for special status wildlife species occurs along each of the alternative routes with the exception of species associated with higher elevation coniferous forests, which are present only in the Chuska Mountains (alternative route C1).

Some special status species are associated with unique habitats, areas that support an unusually diverse or highly restricted assemblage of plants and/or animals. These areas are regionally rare, uncommon, or largely diminished. Generally, there are specific biological issues associated with these unique habitats. Unique terrestrial habitats along alternative routes include The Hogback in New Mexico, the Chuska Mountains in New Mexico and Arizona, the Black Mountains in Arizona, the Aubrey and Hualapai valleys in Arizona, and the Eldorado Mountains in Nevada. Aquatic habitats supporting populations of special status fish and wetland/riparian habitats include the San Juan, Colorado, and Little Colorado rivers. Table D-3 summarizes special status species associated with unique habitats by state.

There are two Federally listed endangered species that historically occurred in the project area and for which suitable habitat exists. Black-footed ferrets inhabited grasslands that support Gunnison's prairie dogs. In March 1996, black-footed ferrets were released in the Aubrey Valley, which is traversed by several alternative routes. California condors are to be released in the Vermillion Cliffs west of Page.

Both are designated as nonessential, experimental populations, which reduce the level of protection afforded them under the Endangered Species Act (ESA).

The project area has not been systematically surveyed for special status species plants and wildlife. Because an analysis based solely on known presence of species does not accurately reflect the true distribution within the project area, potential habitat of special status plants and wildlife were identified. This information is intended to serve as a guideline for land-managing and/or regulatory agencies. Prior to construction, surveys would be conducted in areas the agencies consider sensitive.

Potential habitat was identified with the one-mile-wide corridor of alternative routes for 24 of the 59 species of special status plants listed by the various agencies. Potential habitats are shown on Figures MV-5E and MV-5W and included in the discussions below for each alternative.

ALTERNATIVES

The following summaries address vegetation types, wildlife, and special status species with emphasis on unique areas and Federally listed species most likely to be present. Figures MV-3E through MV-5W illustrate these resources within a one-mile-wide corridor. Additional information is provided in several tables in Appendix D.

Eastern Area Transmission Line Alternatives

Glen Canyon 1 (GC1)

New Mexico

Vegetation—This portion of GC1 (Links 100, 120, and 460) crosses areas of Great Basin desertscrub and Great Basin/Plains grasslands, both of which are common throughout northern New Mexico. Great Basin/Plains grasslands typically occur at slightly higher elevations.

GC1 crosses a relatively short expanse of riparian vegetation along the San Juan River (Link 460). This riparian area consists of willow thicket and scattered cottonwoods, and is crossed by an existing transmission line parallel to GC1.

The Hogback, a unique geologic formation located east of Shiprock, New Mexico, is partially within a designated BLM ACEC. The higher elevations of The Hogback are dominated by grassland habitat, with Great Basin desertscrub at the lower elevations. Partly due to its location at the interface of several biogeographical provinces, the vegetation in this region is relatively rich and supports a diverse number of plant species of special concern (Dunmire 1992). Vegetation is characterized by scattered sub-shrubs (saltbushes) and grasses (galleta and Indian ricegrass), and numerous annuals. Areas underlain by sandstone support small trees, including juniper, single-leaf ash, and mountain-mahogany. Piñon is very sparse.

Wildlife—Wildlife populations along the New Mexico portion of GC1 include various reptiles, birds, and small mammals. Mule deer are year-round residents of the San Juan River valley, and in winter migrate from Colorado into areas east and north of the river. Mule deer are the primary big game species in this area. Mountain lions may occasionally be present on the vicinity of The Hogback. Pronghorn are present in the general vicinity. Native fish species are present in the San Juan River.

Numerous bird species inhabit the riparian areas along the San Juan River and hunt over the open grasslands. Raptors are numerous, including ferruginous hawk, Swainson's hawk, northern harrier, prairie falcon, and barn owl. Waterfowl and shorebird species are found along the San Juan River (Link 460), especially during migration periods.

Special Status Species—A recent survey for Mesa Verde cactus (Federally listed as threatened) did not identify any individual plants along Link 100 within The Hogback ACEC, although the species has been known to be present there. No occurrences of special status wildlife species are known except for fish in the San Juan River, which is designated critical habitat for the razorback sucker and Colorado squawfish, both Federally listed as endangered. Also, the flannelmouth sucker, roundtail chub, and mottled sculpin inhabit the river.

Several special status plant species potentially occur along Links 100 and 120, including two that are Federally listed—Mesa Verde cactus (threatened) and Mancos milkvetch (endangered). No populations of Mesa Verde cactus or Mancos milkvetch were observed along Link 100 during surveys conducted within The Hogback ACEC (Ecosphere 1995). In addition, there is habitat suitable for Mesa Verde cactus along Link 460.

Potential habitat exists for the bald eagle and peregrine falcon, both of which are Federally listed endangered species. Although no nest sites have been identified, bald eagles inhabit riparian areas adjacent to the San Juan River during the winter months. Peregrine falcons nest in cliffs adjacent to open water (Link 460). The endangered southwestern willow flycatcher may inhabit riparian areas along the San Juan River. Golden eagles may nest along mesas or buttes that occur along this alternative route. Prairie dog colonies that exist along Link 460 may be large enough to support the endangered black-footed ferret.

Arizona

Vegetation—Vegetation along this portion of GC1 is similar to that found in the New Mexico portion, and is dominated by Great Basin desertscrub with scattered areas of Great Basin/Plains grasslands and piñon-juniper woodland. Narrow strands of riparian habitat, primarily tamarisk and camelthorn, are present along ephemeral drainages throughout the area as well as along the Little Colorado River near the Moenkopi Substation area.

Wildlife—Wildlife species along this portion of GC1 are similar to those found along the New Mexico segment and are characteristic of Great Basin desertscrub and Great Basin/Plains grassland habitat. In addition, wildlife in this area includes species typically associated with piñon-juniper woodlands, such

as mule deer, golden eagle, cottontail, red-tailed hawk, and numerous rodents. Mule deer and antelope occur along this alternative route and use Marsh Pass during migration.

Special Status Species—There is known raptor habitat north of Black Mesa, golden eagle nesting habitat near The Gap, and Coconino Arizona pocket mouse habitat in the general area of the Moenkopi Substation.

Suitable habitat for special status species is present. Navajo sedge, Federally listed as threatened, inhabits seep springs on the vertical cliffs or benches of pink-red Navajo Sandstone. Populations of this sedge exist in the general area and others may exist along Links 501 and 581. Habitat exists that could support several Federal Candidate C2 species including the Roaring Springs prickly poppy, Nipple Beach phacelia, Tusayan flame flower, and Cameron water-parsley. Also, there is potential for the Fickeisen plains cactus, which is a Federal Candidate C1 species, to be present.

Peregrine falcons and bald eagles inhabit the riparian areas associated with the Colorado River and may forage in the vicinity of Page (Links 620 and 1389). Peregrine falcons may nest on steep cliffs of mesas and buttes (Links 504 and 561). Northern goshawks have the potential to occur throughout piñon-juniper woodlands and ponderosa pine forests. There is suitable habitat for other nesting raptors, including the ferruginous hawk in open badlands, as well as for golden eagles on cliff faces and buttes. No nest sites are known. Prairie dog colonies exist in the vicinity of Red Mesa and could support black-footed ferrets (Links 460 and 461). There is potential habitat for the Coconino Arizona pocket mouse along Link 1386. There are plans to release California condors, listed as endangered, west of Page and northwest of GC1.

Kaibito 1 (K1)

New Mexico

The New Mexico portion of K1 is the same as GC1.

Arizona

The Arizona portion of K1 is the same as GC1 except for the use of Links 1390 and 1391 across the Kaibito Plateau (which replace Links 587, 620, 621, 627, and 1389 on GC1).

Vegetation—Vegetation along this segment of K1 is primarily a mosaic of Great Basin desertscrub and piñon-juniper woodland.

Wildlife—Wildlife in the area of K1 is characteristic of Great Basin desertscrub, Great Basin/Plains grasslands, and piñon-juniper woodlands summarized in Table 3-1.

Special Status Species—No known populations of special status species occur along this segment of alternative K1.

Potential Occurrences—Potential habitat for Navajo sedge was identified along Links 1390 and 1391.

Central 1 (C1)

New Mexico

Vegetation—This portion of C1 crosses a mosaic of Great Basin desertscrub and Great Basin/Plains grasslands on the flatlands, with piñon-juniper woodlands dominating the eastern edge of the Chuska Mountains and northern foothills of Beautiful Mountain (Link 700). This segment of C1 also crosses through The Hogback. Riparian vegetation, primarily cottonwood-willow with some exotics such as camelthorn and tamarisk, is present along the San Juan River (Link 240) and along drainages from the Chuska Mountains (Link 700).

Wildlife—Wildlife along C1 is characterized by those species inhabiting Great Basin desertscrub, Great Basin/Plains grasslands, and piñon-juniper woodlands (see Table 3-1). The foothills of the Chuska Mountains support numerous big game species and provide habitat for other small mammals and birds, including several raptor species. Big game include mule deer, black bear, mountain lion, and Merriam's turkey.

Special Status Species—Two special status plant species are known to be within the one-mile-wide study corridor of C1. A survey conducted in spring 1995 (Ecosphere 1995) located populations of Mesa Verde cactus on The Hogback ACEC along Link 180 (354 plants), and Link 240 (651 plants). Mancos milkvetch is present along C1 in the area of The Hogback, although no plants were located during surveys conducted within the ACEC boundaries (Ecosphere 1995). Both the riparian and aquatic habitats of the San Juan River and the foothills of the Chuska Mountains support wildlife species of concern. The San Juan River (downstream from where the river would be crossed by the line) is designated critical habitat for the Colorado squawfish and razorback sucker, which are Federally listed as endangered. Other special status fish species in the river are the flammulated sucker, roundtail chub, and mottled sculpin.

Habitat suitable for Mesa Verde cactus is present on Navajo lands (Links 360, 640, and 700). The cottonwood-willow riparian habitat associated with the San Juan River supports wintering bald eagles, peregrine falcons, and potentially the southwestern willow flycatcher. No nest or roost sites have been identified. Open grasslands west of The Hogback provide habitat for prairie dog colonies that could support black-footed ferrets.

Arizona

Vegetation—This segment of C1 crosses a variety of vegetation types including Great Basin desertscrub, Great Basin/Plains grasslands, piñon-juniper woodlands, and ponderosa pine woodlands at the higher elevations of the Chuska Mountains (Link 700). This is the only ponderosa pine along any of the alternative routes, making this area the most biologically diverse in the project area. C1 also crosses a small area of riparian vegetation adjacent to the Little Colorado River, east of the Moenkopi Substation area.

Wildlife—C1 crosses approximately six miles of ponderosa pine forest, which support a relatively large variety of wildlife species that are not found in other habitat types (e.g., Abert's squirrel, Mexican vole, and long-eared myotis). Big game species likely to occur include Merriams' turkey, black bear, mountain lion, and mule deer. Crucial winter habitat for mule deer exists on the eastern slope (McCoy 1996). Link 700 through the Chuska Mountains parallels an existing 500kV transmission line and access road.

Special Status Species—No special status plant species are known to exist along the Arizona portion of C1. The Chuska Mountains have been designated as critical habitat for the Mexican spotted owl, and the edge of one management territory for a spotted owl is adjacent to the corridor.

Suitable habitat exists for three Federal candidate C2 species: Tusayan rabbitbrush (Links 700 and 780), gladiator milkvetch (Link 700), and Tusayan flameflower (Link 780). Golden eagles and ferruginous hawks could occur, although no nest sites have been identified. Golden eagles are known to nest on mesas and buttes (Links 700 and 780), while ferruginous hawks are migratory or rare nesters in badlands. Suitable habitat for the Cononino Arizona pocket mouse exists in the vicinity of Cameron (Link 780).

Central 2 (C2)

New Mexico

The New Mexico portion of C2 is the same as GC1 and K1.

Arizona

The Arizona portion of C2 varies from C1 by passing to the north and west of the Chuska Mountains on Link 460 near Teec Nos Pos and Link 462 in the Chinle Valley and across Carson Mesa. The portion of C2 from the Lohali Mesa area west to the Moenkopi Substation along Link 780 is the same as C1.

Vegetation—Vegetation along Links 460 and 462 is dominated by Great Basin desertscrub with scattered areas of Great Basin/Plains grasslands and small areas of piñon-juniper woodlands. Riparian habitats characterized by tamarisk and greasewood exist along ephemeral drainages.

Wildlife—Wildlife along C2 (Links 460 and 462) is characteristic of Great Basin desertscrub, Great Basin/plains grasslands and piñon-juniper woodlands (see Table 3-1).

Special Status Species—No special status plant or wildlife species (except golden eagles) are known to exist along this segment of C2.

Habitat suitable for one Federally listed threatened species, Navajo sedge, exists along Link 462. Suitable habitat also exists for Tusayan rabbitbrush along Link 462. Goshawk may occur throughout piñon-juniper woodlands in winter. Golden eagles could nest on the cliffs of mesas and buttes throughout the area.

Substation Alternatives

Shiprock Substation—The existing substation is surrounded by The Hogback ACEC in an area of Great Basin desertscrub. Known habitat for Mesa Verde cactus and several populations of this cactus are present in the vicinity. No special status wildlife species are known to exist in the area.

Honey Draw Substation Site—The area of the site supports Great Basin desertscrub and wildlife species characteristic of this vegetation type; however, the area is degraded. Raptors, including the bald eagle and peregrine falcon, inhabit nearby Glen Canyon and potentially forage over the area.

Red Mesa Substation Site—The site is located adjacent to an existing 345kV transmission line in an area of Great Basin desertscrub habitat. No special status plants or wildlife species are known in the vicinity.

Copper Mine Substation Site—The site, also located adjacent to an existing 345kV line, is characterized by Great Basin plains/grasslands and piñon-juniper. No special status species are known in the vicinity; however, habitat suitable for Candidate C2 species, Tusayan flameflower, is present. There is moderate potential for pronghorn in the area.

Moenkopi Substation—The area of the existing substation is located within Great Basin desertscrub in an area that has been disturbed. No known or potential habitat exists for special status plants. One Federal Candidate C2 species, the Coconino Arizona pocket mouse, may be present in the vicinity.

Western Area Transmission Line Alternatives - Moenkopi to Marketplace

Northern 1 West (N1W)

Arizona

Vegetation—Great Basin desertscrub is limited to the vicinity of Moenkopi (Link 1400). Great Basin/Plains grasslands characterize the Aubrey Valley (Links 1740 and 1741) and the Coconino Plateau (Link 1660). Piñon-juniper woodlands exist east and west of Aubrey Valley and on the Music Mountains and Grand Wash Cliffs (Link 1790). These two vegetation types are prevalent from Moenkopi west across the Hualapai Reservation (Links 1400, 1401, 1660, and 1790). The Hualapai Valley and the Black Mountains west to the Arizona and Nevada border are characterized by Mohave desertscrub (Link 2060). There is a stand of paloverde trees, which represents the northern limit of their range, located south of Link 2060 in Lake Mead NRA.

Wildlife—Wildlife along this segment of N1W is characteristic of Great Basin/Plains grasslands, piñon-juniper woodlands, and Mohave desertscrub (see Table 3-1). Pronghorn are present throughout the grasslands and are especially prevalent in the Aubrey Valley, Big Boquillas Ranch, and across portions of the Hualapai Indian Reservation. A movement corridor for pronghorn exists on the Truxton Plain. Elk also are present on the Hualapai Indian Reservation. Desert bighorn sheep and mountain lions inhabit the Black Mountains (Link 2060) and lambing grounds are located in the Fire Mountain complex north of the alternative route.

Special Status Species—Locations of Tusayan flameflower (Link 1400) and Tusayan rabbitbrush (Link 1660) are known along N1W. Known habitat exists for the Coconino Arizona pocket mouse (Link 1400), a candidate C2 species. The Hualapai Mexican vole, a Federally listed endangered species, is found in the Music Mountains on land administered by BLM, but is not known to be present along the alternative route. The vole may inhabit the adjacent Hualapai Reservation in the vicinity of Link 1790. Black-footed ferrets were reintroduced in the Aubrey Valley, which supports high quality habitat and healthy prairie dog colonies that provide the main prey base for the ferrets. Although the black-footed ferret is a Federally listed endangered species, in this case, the reintroduced population is designated as nonessential and experimental. Alternative N1W crosses the black-footed ferret management area in the existing utility corridor. Peregrine falcons nest in the Grand Wash Cliffs and may occur along the alternative route, although no nest sites have been identified. Arizona toad inhabits Milkweed Canyon on the Hualapai Indian Reservation (Link 1790). The Sonoran population of desert tortoise, a Federal candidate C2 species, is found throughout uplands in the Mohave Desert (Link 2060). The chuckwalla and banded Gila monster, both C2 species, are known to inhabit rocky areas in Mohave desertscrub.

The Colorado River supports a diverse fisheries population (Link 2060) and is designated critical habitat for two listed species, the Colorado squawfish and razorback sucker.

Potential habitat exists west of Moenkopi for several other candidate species including Welsh phacelia, Cameron water-parsley, Fickeisen plains cactus, and Roaring Springs prickly poppy. Suitable habitat exists for the Coconino Arizona pocket mouse west of Cameron (Link 1400). Swainson's and ferruginous hawks are known to nest in the Hualapai Valley (Links 1790 and 2060); although no nest sites have been identified along the alternative route. Northern goshawk may winter in piñon-juniper woodlands. The riparian habitat associated with the river supports wintering populations of bald eagles. Peregrine falcons use the cliffs in the vicinity of the river, but primarily on the Nevada side.

Nevada

Vegetation—This portion of N1W is characterized by Mohave desertscrub (Links 2060, 2200, and 2180) with the exception of a narrow riparian strip along the Colorado River.

Wildlife—Bighorn sheep inhabit the Eldorado Mountains along the alternative route (Link 2060); Aztec Spring provides a water source. Reptiles are prevalent throughout the desert habitat and include Gila monsters, chuckwalla, and several species of lizards and snakes.

Special Status Species—The Mojave population of the desert tortoise, a Federally listed threatened species, is known to inhabit the Mohave desert of southern Nevada. N1W traverses designated critical habitat for the Mojave population of desert tortoise. The Colorado River supports a diverse fisheries population (Link 2060) and is designated critical habitat for two listed species, the Colorado squawfish and razorback sucker.

There is a high potential for two Federal candidate C2 plant species, the rosy and twotone beardtongues, to be present along the gravelly, dry washes throughout the Eldorado Valley (Links 2180 and 2200). However, there are no known locations of these two subspecies along N1W. Riparian habitat associated

with the river supports wintering populations of bald eagles. Peregrine falcons use cliffs in the vicinity of the river.

Northern 2 (N2)

Arizona

The Arizona portion of N2 is the same as N1W with the exception of Links 1742, 1800, 1980, and 2020, which are located to the south of the Hualapai Indian Reservation (and replace Link 1790 on N1W).

Vegetation—Vegetation along this segment of N2 is dominated by Great Basin/Plains grasslands and piñon-juniper woodlands to the east (Links 1742, 1800, and 1980), and Mohave desertscrub to the west (Link 2020).

Wildlife—Big game species of Great Basin/Plains grasslands include mule deer and pronghorn. Pronghorn inhabit the Truxton Plains area (Link 1980). Elk are present on the Hualapai Reservation, north of this alternative route.

Special Status Species—Several special status wildlife species are present along this alternative. Swainson's and ferruginous hawks are known to nest in the Hualapai Valley (Link 2020), although no nest sites have been identified within the one-mile-wide inventory corridor. Peregrine falcons are known to nest in the Grand Wash Cliffs (Link 1980) and may be present near the area crossed by N2. N2 crosses the black-footed ferret management area in the Aubrey Valley (Links 1740, 1741, and 1742).

Special status plant species that have the potential to exist along this alternative are the same as those discussed for N1W. One additional Federal candidate C2 species, the freckled milkvetch, is present in the area and may be present along Link 1980. Special status raptor species, including the northern goshawk, could be present in piñon-juniper woodlands scattered along the alternative route (Links 1742, 1800, and 1980).

Nevada

The Nevada portion of N2 is the same as N1W.

Southern (S2)

In Arizona, S2 varies from N2 beginning at the Moenkopi Substation and continuing west through Link 2006. At this point, S2 is then the same as N2 proceeding north and west along Links 2020 and 2060 to the crossing of the Colorado River and the Nevada border.

Arizona

Vegetation—The vegetation traversed by this segment of S2 is characterized by a mosaic of Great Basin/Plains grasslands and piñon-juniper woodlands (Links 1420, 1421, 1480, 1520, 1640, 1680, 1720, 1960, and 2006), piñon-juniper woodlands in the vicinity of Hackberry (Links 2000 and 2002), and a relatively short distance of sand dune scrub/bare sand (Link 2006). Similar to N1W and N2, this alternative crosses a small area of riparian vegetation along the Colorado River.

Wildlife—Big game present along this segment of S2 are characteristic of grassland and piñon-juniper woodland habitats. Mule deer are common in the more hilly eastern portion (Links 1640, 1680, and 1720), while pronghorn tend to inhabit grasslands in valleys (Links 1960, 2000, and 2020).

Special Status Species—No populations of listed endangered or threatened plant species are known along S2, although populations of Tusayan rabbitbrush, a Federal candidate C2 species, are present (Links 1640 and 1680). Peregrine falcons nest in the Cottonwood Cliffs (Link 2000), and Swainson's hawks nest in the Hualapai Valley (Link 2006).

Habitat suitable for several Federal candidate (C1 and C2) plant species exists, including Welsh phacelia (Link 1420), Cameron water-parsley (Link 1420), Fickeisen plains cactus (Link 1420), Tusayan flameflower (Links 1480, 1520, 1680, 1960, and 2000), Roaring Springs prickly poppy (Links 1720 and 2000), and freckled milkvetch (Link 2000). The Coconino Arizona pocket mouse may be present along S2 in the vicinity of the Moenkopi Substation (Link 1420). Northern goshawk may winter in the piñon-juniper woodlands.

Nevada

The Nevada portion of S2 is the same as N1W and N2.

Western Area Transmission Line Alternatives - Moenkopi to Mead

Northern 3 (N3), Northern 4 (N4), and Southern 4 (S4)

Alternatives N3, N4, and S4 are identical to alternatives N1W, N2, and S2, respectively, with the exception of Links 2040 and 2080, which connect into the Mead Substation rather than the Marketplace Substation (replacing Links 2060, 2200, and 2180). The following description focuses on Links 2040 and 2080.

Arizona

Vegetation—Vegetation along this segment from the Hualapai Valley west to the Colorado River (Link 2040) consists of Mohave desertscrub with several small areas of riparian vegetation associated with ephemeral drainages.

Wildlife—Desert bighorn sheep inhabit the Black Mountains (Link 2040), and lambing grounds are present along this link (Arizona and Nevada) within the Lake Mead NRA.

Special Status Species—Based on surveys within the Lake Mead NRA conducted for other projects concerning desert tortoise (Sonoran population), it appears that numbers of tortoises are denser along Link 2040 than along Link 2060 to the south. Populations of chuckwalla and banded Gila monsters are present in rockier areas.

The Colorado River supports a diverse fisheries population (Link 2040) and is designated critical habitat for two listed species, the Colorado squawfish and razorback sucker. The riparian habitat associated with the river supports wintering populations of bald eagles. Peregrine falcons use the cliffs in the vicinity of the river (primarily on the Nevada side). Swainson's and ferruginous hawks are present in the Hualapai Valley in the vicinity of Link 2040.

Nevada

Vegetation—Links 2040 and Link 2080 are characterized by Mohave desertscrub. Isolated patches of riparian vegetation exist along the Colorado River and may be present where the alternative route crosses the river.

Wildlife—The main big game species in the area is the desert bighorn sheep, which inhabit the Eldorado Mountains. Lambing grounds for bighorn sheep exist within the Lake Mead NRA.

Special Status Species—This alternative route traverses designated critical habitat for the Mojave population of the desert tortoise, a Federally listed threatened species present throughout the Mohave Desert of southern Nevada.

There is a high potential for two Federal candidate C2 plant species, the rosy and twotone beardtongues, to be present along the gravelly, dry washes associated with Links 2040 and 2080. However, there are no known specific locations for these two subspecies along these links. Populations of chuckwalla and banded Gila monsters inhabit rockier areas in the vicinity. The riparian habitat associated with the Colorado River (Link 2040) supports wintering populations of bald eagles. Peregrine falcons use the cliffs in the vicinity of the river.

Substation Alternatives

Red Lake Substation Site—The site is characterized by piñon-juniper woodlands and juniper grasslands that support populations of mule deer. No specific or potential locations of special status plants or wildlife are known at this site.

Marketplace and Mead Substations—The areas are characterized by Mohave desertscrub. The habitat is degraded because of existing facilities.

Microwave Communication Facility

The peak of Bill Williams Mountain is more than 9,000 feet in elevation and supports ponderosa pine forests. Big game and raptors may be present in this area. Potential habitat exists for special status plant species including the Arizona leatherflower and Tusayan flameflower.

PALEONTOLOGICAL RESOURCES

The inventory of paleontological resources has been limited to literature and records searches and review of previous field survey reports in parts of the area. No fieldwork was conducted specifically for this project. Scientifically significant fossil resources include the remains of large to small vertebrates, plants, and invertebrates, and the traces or tracks of these organisms. Particularly important are individual organisms or assemblages of plants and animals that are unique, rare, age diagnostic, or stratigraphically important, and that add to existing scientific knowledge of geology or evolutionary biology.

The purpose of the paleontological resources investigation is to identify areas with potential to produce fossils. Guidelines established by members of the paleontologic community and recognized by BLM (Society of Vertebrate Paleontologists 1990) consider fossils to be of significant scientific value if they (1) provide important information regarding the development of biological communities or interactions between botanical and zoological biotas; (2) demonstrate unusual or spectacular circumstances in the history of life; or (3) are in short supply and in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation. BLM recently adopted guidelines (March 1996) by which lands administered by BLM may be classified and ranked based on their likelihood to contain noteworthy occurrences of fossils.

The inventory of paleontological resources is reported by specific geologic deposits and the known potential of those deposits to yield scientifically important or significant fossils. For NTP, three levels of potential were used to evaluate paleontology: high, low or none, and unknown. An area of high paleontologic potential will usually only contain a small area of fossil productivity, so only detailed investigation, once a route is selected for construction, could reveal specific areas likely to yield significant fossil resources.

The results of the paleontological resources inventory are summarized below in an overview of the project area that describes fossil types associated with paleontologic ages and the paleontologic potential based on geologic deposits. Following the overview are descriptions of the paleontological resources along each alternative route. Figures MV-6E and MV-6W illustrate the potential for paleontological resources within a one-mile-wide corridor.

OVERVIEW

Paleontological Ages—The inventory documented the presence of diverse vertebrate, invertebrate, and plant fossils of scientific significance in sedimentary deposits of Paleozoic, Mesozoic, and Cenozoic ages underlying the alternative routes in northwestern New Mexico, northern Arizona, and southern Nevada.

Paleozoic Age—The early Paleozoic deposits include worms, sponges, corals, bryozoans, and other invertebrates. During this age Trilobite arthropods were particularly abundant in the oceans, while primitive fish and amphibians gave rise to modern amphibians, reptiles, and land vertebrates.

Mesozoic Age—Also of particular importance are fossils of terrestrial and marine vertebrates, invertebrates, and plants of the Mesozoic age. Deposits of this age are known worldwide for vertebrate fossils that have been the source of much of the body of scientific information about the evolution of life during the Triassic, Jurassic, and Cretaceous periods. The Triassic period was a critical time during the evolution of land vertebrates. It was during this time period that mammals evolved and dinosaurs inhabited the earth. Preserved within some of the deposits traversed by the alternative routes are the fossils of some of these early mammals and the abundant remains of their close therapsid (mammal-like) reptilian ancestors, as well as the well-preserved body fossils and trackways of some of the earliest dinosaurs. During the Jurassic period, dinosaurs gained mastery of the earth, gymnosperm plants continued to dominate the flora, and early birds evolved. The Cretaceous was a period of major changes including the extinction of the dinosaurs at the end of the period.

Cenozoic Age— The Cenozoic age is divided into the Tertiary and Quaternary periods. During the early Tertiary period, there was a rapid diversification of mammals and birds. Primitive mammals were progressively replaced by more advanced lineages. The Quaternary period was a time of climatic changes as glaciers expanded and receded during the Pleistocene. Larger mammalian fauna become dominant in North America.

Paleontologic Potential—Deposits underlying the alternative routes in New Mexico, Arizona, and Nevada include 52 different geologic units. Geologic deposits and their paleontologic potential are summarized by the state in Table 3-3. Twenty-five of these units have been assigned a high paleontologic potential, 13 have been assigned an unknown paleontologic potential, and 14 of the deposits have been assigned a low or no paleontologic potential.

ALTERNATIVES

Eastern Area Transmission Line Alternatives

Glen Canyon 1 (GC1)

New Mexico

GC1 (Links 100, 120, and 460) crosses Cretaceous and Jurassic deposits with a high potential for scientifically important fossils of dinosaurs, mammals, reptiles, fish, plants, and invertebrates.

TABLE 3-3 GEOLOGIC DEPOSITS AND PALEONTOLOGIC POTENTIAL	
High Potential Deposits	
New Mexico	older Quaternary sediments, Fruitland Formation, Pictured Cliffs Sandstone, Lewis Shale, Cliff House Sandstone, Menefee Formation, Crevasse Canyon Formation, Point Lookout Sandstone, Gallup Sandstone, Mancos Shale, Dakota Sandstone, Morrison Formation, Summerville Formation, Todilto Limestone, Wingate Sandstone
Arizona	older Quaternary sediments, Bidahochi Formation, Wepo Formation, Toreva Formation, Mancos Shale, Dakota Sandstone, Morrison Formation, Kayenta Formation, Moenave Formation, Navajo Sandstone, Wingate Sandstone, Chinle Formation, Moenkopi Formation, Kaibab Limestone, Coconino Sandstone
Unknown Potential Deposits	
New Mexico	Quaternary terrace deposits, Chuska Sandstone, Entrada Sandstone
Arizona	Chuska Sandstone, Rose Well-Frazier Well Gravels, Carmel Formation, Cow Springs Sandstone, Entrada Sandstone, De Chelly Sandstone, Toroweap Formation, Supai Formation (Group), Redwall Limestone, Temple Butte Limestone, Tonto Group
Low Potential Deposits	
New Mexico, Arizona, Nevada	recent alluvial, playa lake, and eolian sediments, volcanic deposits of Quaternary and Tertiary age, Precambrian granites and metamorphics

Arizona

GC1 crosses Jurassic, Triassic, and Cretaceous formations, most of which have a high potential for scientifically important paleontologic resources, such as dinosaur tracks, fossils of reptiles, turtles, dinosaurs, crocodiles, mammals, and fish. Known sites near the reference centerline are located in Tsegi Canyon, near Cameron, and near the Copper Mine Trading Post. Remains of invertebrate and vertebrate fossils have been found in the Mancos Shale at sites adjacent to Link 561. Links 1383 and 1384 cross the Chinle Formation, which is one of the major sources of Late Triassic vertebrate fossils in the western hemisphere. Early horse and mammoth remains have been found near Cameron (Link 1386).

Kaibito 1 (K1)

New Mexico

The New Mexico portion of K1 is the same as GC1.

Arizona

The Arizona portion of K1 is the same as GC1 except for the use of Links 1390 and 1391 across the Kaibito Plateau (which replace Links 587, 620, 621, 627, and 1389 on GC1). The paleontological resources of K1 in this area are similar to the segment of GC1 to the north, consisting of high and unknown potential.

Central 1 (C1)

New Mexico

C1 crosses Cretaceous and Jurassic deposits with a predominantly high potential for scientifically important paleontological resources (Links 180, 240, 300, 360, and 640). Fossil remains of various dinosaurs, reptiles, mammals, fish, plants, and invertebrates are common in these formations.

Arizona

C1 crosses many formations with a high potential for important paleontological resources. Link 700 would cross Jurassic and Triassic formations including the Chinle Formation, one of the major sources of Late Triassic vertebrate fossils in the western hemisphere. Link 701 crosses Triassic deposits with fossil footprints and bone fragments. Link 780 crosses formations with high potential for fossils of reptiles, fish, dinosaurs (including dinosaur tracks), birds, crocodiles, mammals, plants, and invertebrates. There is a known fossil location in the Mancos Shale along Link 780. In the vicinity of Link 780, there are also 13 localities recorded by the Museum of Northern Arizona (MNA) on the flanks of Howell Mesa (south of Milepost 62), 2 MNA localities along Adeii Eechii Cliffs, and 2 MNA localities of early horse and mammoth remains near Cameron.

Central 2 (C2)

New Mexico

The New Mexico portion of C2 is the same as GC1 and K1.

Arizona

The Arizona portion of C2 varies from C1 by passing to the north and west of the Chuska Mountains along Link 460 near Teec Nos Pos and Link 462 in the Chinle Valley and across Carson Mesa. The portion of C2 from the Lohali Mesa area west to the Moenkopi Substation along Link 780 is the same as C1. This portion of C2 crosses many formations with a predominantly high potential for scientifically important paleontological resources. Links 460 and 462 cross Jurassic and Triassic formations with high

potential for fossils of dinosaurs (and dinosaur footprints), mammal-like reptiles, mammals, crocodiles, reptiles, fish, and invertebrates.

Substation Alternatives

Shiprock Substation—The site is located in an area underlain by potentially fossiliferous sediments of the Cretaceous Pictured Cliffs Sandstone, which has a high potential for fish, turtle, crocodile, plesiosaur, ornithischian (bird-hipped) and saurischian (lizard-hipped) dinosaurs, and mammals.

Honey Draw Substation Site—The area is underlain by Jurassic deposits of the Carmel Formation and Navajo Sandstone. The potential for fossils in the Carmel Formation is unknown. The potential for fossils in the Navajo Sandstone is high (dinosaur tracks and partial remains of dinosaurs have been found in Navajo Sandstone).

Red Mesa Substation Site—This area is underlain by Quaternary alluvial and eolian sediments overlying Triassic-Jurassic deposits of the Carmel Sandstone. The potential for important resources is unknown.

Copper Mine Substation Site—This area is underlain by Quaternary alluvial and eolian sediments overlying Triassic-Jurassic deposits of the Navajo Sandstone. Dinosaur tracks and partial remains of dinosaurs are known to exist in Navajo Sandstone and a known location is near the Copper Mine Trading Post approximately nine miles northeast of the substation site. Because these important paleontological resources exist in Navajo Sandstone, there is a high potential for fossils at this site.

Moenkopi Substation—The area is underlain by Triassic deposits of the Shinarump Member of the Chinle Formation, which has a high potential for paleontologic resources. The Chinle is one of the major sources of Late Triassic vertebrate fossils in the western hemisphere. Known fossil localities in this formation are southwest of Cameron.

Western Area Transmission Line Alternatives - Moenkopi to Marketplace

Northern 1 West (N1W)

Arizona

N1W crosses the Shinarump Member of the Chinle Formation, Kaibab Limestone, and Coconino Sandstone with high potential for fossil vertebrates and invertebrates (Links 1400, 1401, and 1660). There are also broad areas of Quaternary alluvium and volcanics with low or no potential for fossil resources. From the Aubrey Valley westward, the N1W crosses Quaternary alluvium and various other formations with predominantly low or no potential. The potential for fossils in the Permian, Pennsylvanian, and Mississippian formations along Link 1790 is unknown, but in this case, the potential is probably high.

Nevada

At the Colorado River crossing, the older alluvial deposits have an unknown (but probably high) potential for scientifically important fossils (Link 2060). The remaining Nevada portion of N1W crosses nonfossiliferous Tertiary volcanic rocks and Precambrian metamorphic rocks as well as Quaternary alluvial and eolian deposits with low potential (Links 2200 and 2180).

Northern 2 (N2)

Arizona

The Arizona portion of N2 is the same as N1W with the exception of Links 1742, 1800, 1980, and 2020, which are located to the south of the Hualapai Indian Reservation and replace Link 1790 on N1W. Paleontological resources along this segment of N2 are similar to those along Link 1790 on N1W.

Nevada

The Nevada portion of N2 is the same as N1W.

Southern 2 (S2)

Arizona

In Arizona, S2 varies from N2 beginning at the Moenkopi Substation and continuing west through Link 2006. At this point, S2 is then the same as N2 proceeding north and west along Links 2020 and 2060 to the crossing of the Colorado River and the Nevada border. This segment of S2 crosses the Shinarump Member of the Chinle Formation and Kaibab Limestone with a high potential for vertebrate and invertebrate fossils. There are also broad areas of Quaternary alluvium and volcanic rocks with low or no potential for fossil resources. There are four MNA sites in the Kaibab Limestone near Gray Mountain (Link 1420). The central portion of this alternative crosses volcanics with low or no potential and Kaibab Limestone with a high potential for fossil fish and invertebrates. From the Cottonwood Cliffs westward, this alternative crosses Quaternary alluvium and various other formations with low or no potential. The Permian, Pennsylvanian, and Mississippian formations along Links 1720 and 1960 have an unknown, but in this case, probably high potential.

Nevada

The Nevada portion of S2 is the same as N1W and N2.

Western Area Transmission Line Alternatives - Moenkopi to Mead

Northern 3 (N3), Northern 4 (N4), and Southern 4 (S4)

Alternatives N3, N4, and S4 are identical to alternatives N1W, N2, and S2, respectively, with the exception of Links 2040 and 2080, which connect into the Mead Substation rather than the Marketplace Substation (replacing Links 2060, 2200, and 2180). The following description focuses on Links 2040 and 2080.

Arizona and Nevada

At the Colorado River crossing, the older alluvial deposits have an unknown (but probably high) potential for scientifically important fossils (Link 2040). In Nevada, Links 2040 and 2080 cross nonfossiliferous Tertiary volcanic rocks and Precambrian metamorphic rocks, as well as Quaternary alluvial and colian deposits with low potential.

Substation Alternatives

Red Lake Substation Site—This site is located in an area that generally consists of Quaternary basalt overlying Kaibab Limestone. The Quaternary basalt has low or no potential for fossils, while the Kaibab Limestone has a high potential for vertebrate and invertebrate fossil resources.

Marketplace Substation and Mead Substation—Both sites are located in an area of Quaternary alluvium and eolian deposits. The potential for fossil resources is low.

Microwave Communication Facility

There is no potential for fossil resources at this location.

LAND USE

The land use inventory for the alternative routes includes descriptions of (1) linear features; (2) land jurisdiction; (3) existing land uses; (4) future land uses; and (5) parks, preservation, and recreation areas. Land uses were inventoried within a six-mile-wide study corridor (three miles on each side of the alternative route reference centerline) to identify land uses that could be affected both directly and indirectly by project construction and operation. The results of the land use inventory focus on areas within 500 feet of the alternative routes. The overview section below introduces each component of the land use inventory and is followed by descriptions of land uses for each alternative in the eastern and western areas. Appendix E contains tables that supplement the text.

OVERVIEW

Linear Features—A priority for siting NTP was to use opportunities to parallel existing utility corridors, to be more compatible with the existing land uses (Figures 3-3 and 3-4, Table E-2). Utility corridors in the project area contain facilities such as transmission lines, pipelines, and/or fiber optic cables. Sixty to one-hundred percent of each alternative route is parallel to existing transmission lines.

Where existing transmission lines cross Federally administered lands, the NPS, BLM, and Forest Service have designated them as utility corridors, with one exception. The BLM Farmington District reviews proposed linear facilities on a case-by-case basis. Designated utility corridors on Federal lands are listed in Table E-2. Linear features crossed by NTP alternative routes include major roads, transmission lines, and pipelines.

Jurisdictions—The alternative routes pass through three states and seven counties: New Mexico (San Juan County); Arizona (Apache, Navajo, Coconino, Yavapai, and Mohave counties); and Nevada (Clark County). Incorporated communities within the project area include Page and Seligman, Arizona; and Boulder City, Nevada.

Lands along the alternative routes include those privately owned and those administered by Federal, tribal, or state agencies. Federal agencies that administer lands include BLM, Forest Service, NPS, and the Bureau of Reclamation (BOR). Three American Indian reservations are held in trust by the Federal government on behalf of the Navajo Nation, Hopi Tribe, and Hualapai Tribe, respectively. Also, the Navajo own land (fee simple) off the Navajo Reservation (Big Boquillas Ranch area) and the Hualapai own land off the Hualapai Reservation (Crozier Ranch area). Over the last 100 years, the ownership of certain Navajo and Hopi lands has been under dispute. These areas encompass the lands created by the 1934 boundary bill that defined the borders of the Navajo Reservation. The Bennett Freeze is a statutory restriction, or "freeze," on development in an area in the western portion of the 1934 reservation. The Bennett Freeze does not preclude all development; rather it prohibits development of lands without written consent of both tribes. The four alternative routes in the eastern portion of the project area would cross and be affected by the Bennett Freeze and possibly other lands in litigation within the 1934 reservation.

The state of Arizona administers and owns land crossed by NTP alternatives, but no state lands are crossed by the alternative routes in New Mexico and Nevada.

Land jurisdictions within a six-mile-wide corridor for the alternatives are shown on Figures MV-7E and MV-7W, and the amount of each jurisdiction crossed by the alternative routes is shown in Table E-3. The Navajo Nation agencies and chapters are depicted on Figure 3-5, and the amount of each agency and chapter crossed by the alternative routes is provided in Table E-4.

Existing Land Use—Existing land uses include the following major categories—residential, agriculture, timber management, rangeland for grazing, and mining.

Residences (including hogans) are dispersed throughout the project area, but are present in greater concentrations along major transportation routes and where there are reliable sources of water. Mixes

of residential, commercial, industrial, and public uses were identified in the communities of Waterflow, Shiprock, and Fruitland in New Mexico; Teec Nos Pos, Red Mesa, Dennehotso, Shonto, The Gap, Lechee, Page, Dinnebito, Lukachukai, Grand Canyon Caverns, Peach Springs, Truxton, Seligman, and Hackberry in Arizona; and Boulder City in Nevada.

The inventory of residences was initially conducted within a six-mile-wide corridor in support of visual resource investigations. Follow-up land use studies were then conducted within a 500-foot-wide corridor for routes adjacent to an existing transmission line, and within a 1,000-foot-wide corridor for new route locations. Figures MV-8E and MV-8W provide a display of residences recorded at the general scale within a six-mile-wide corridor. The 500-foot-wide inventory corridor and the proposed NTP right-of-way provide the basis to determine the potential for both direct and indirect impacts on residences, as discussed in Chapter 4. Inventories are based on the established location for the NTP line, relative to which side of an existing line is paralleled. In general, the alternative routes in the eastern area are adjacent to a far greater number of residences than in the western area. The residences that are adjacent to routes through the Navajo and Hopi reservations are located in proximity to towns and roads as well as along existing transmission lines and access roads available for local travel.

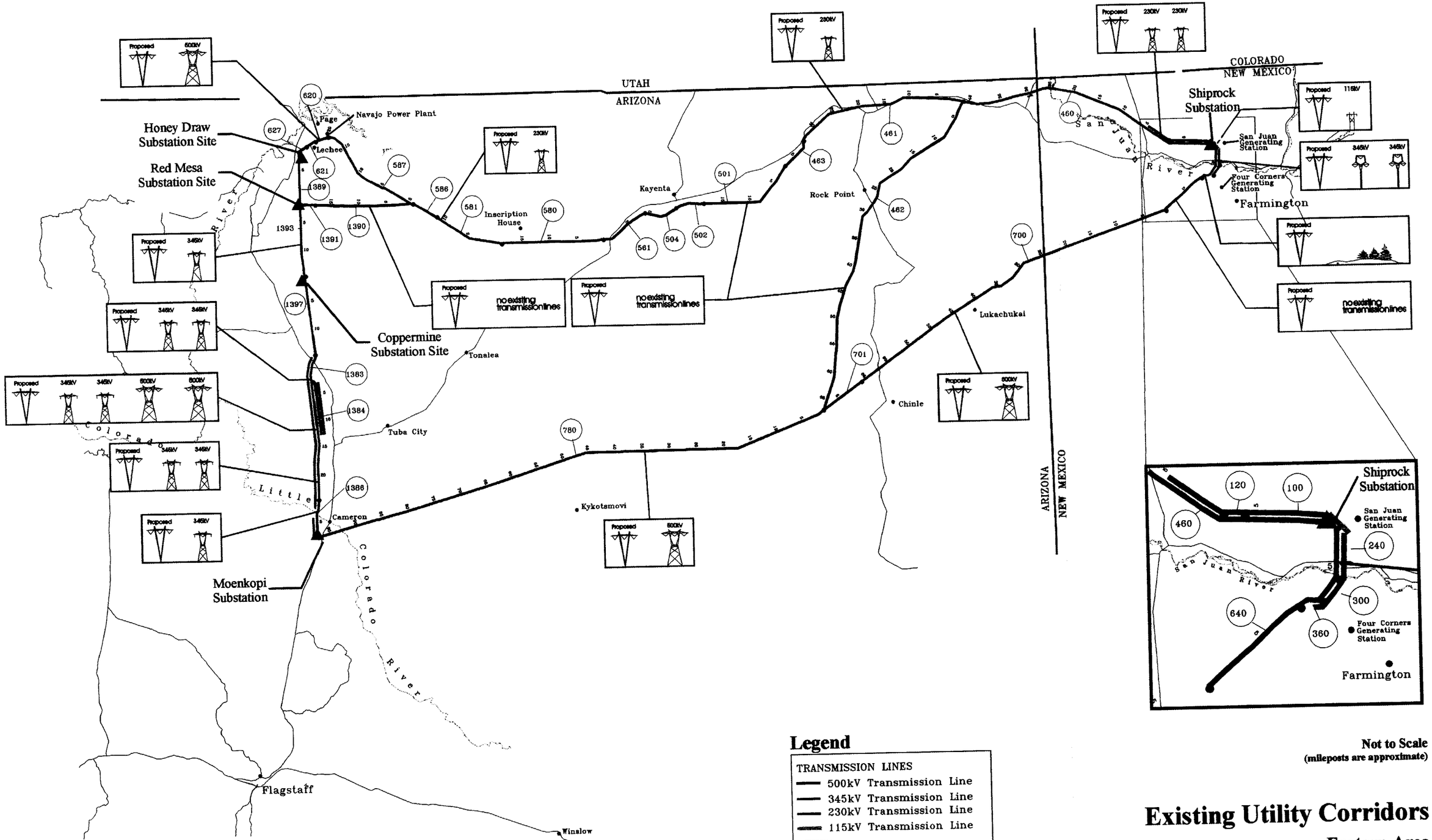
Agricultural crop lands along the alternative routes are typically located in proximity to washes, streams, and rivers. The largest irrigated agricultural area crossed by the alternative routes is in New Mexico near the San Juan River. Another agricultural area is located south of Many Farms in the Chinle Wash. On the Navajo and Hopi lands, settlements and rural residences may have small agricultural fields for personal subsistence. Crops typically grown in the region include alfalfa, corn, and assorted other vegetables. The agricultural inventory along the alternative routes is shown in Figures MV-8E and MV-8W.

Timber management areas for ponderosa pine along the alternative routes are limited to the Chuska Mountains on the Navajo Reservation. Piñon-juniper is managed on the Kaibab National Forest.

Livestock grazing is predominant throughout the project area as shown in Figures MV-8E and MV-8W. Grazing areas and prescribed grazing densities are managed by the BLM, Forest Service, and Arizona State Land Department on their respective lands. Inventories were also conducted for range improvements including fences, water distribution systems, windmills, stock tanks, corrals, and wells. In some areas, sage scrub has been cleared to promote growth of grasses for pasture.

There are a number of large, active mining operations and excavations in the region, primarily in the Arizona portion of the project area (e.g., sand and gravel extraction, large coal mines, and lime mines). All of these active operations would be avoided by the alternative routes. Prior to construction, this inventory would be updated.

Numerous individual, small mining claims are dispersed in areas along the alternative routes but were not researched as a part of the NTP baseline inventory. Prior to construction, BLM would inventory the mining claims along the route to identify and inform the claimants.



Notes: 1) The figure illustrates only existing utility corridors paralleled by NTP alternative routes.
2) The proposed structure for NTP is V-shaped, guyed, single-pedestal, steel lattice as illustrated in this figure. However, in many locations NTP structures would be constructed to match structures along existing transmission lines to minimize visual impacts.
3) The tower illustrations are schematic and relationships between existing and proposed towers are representative only (particularly in corridors containing multiple lines).

Legend

TRANSMISSION LINES
- 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- 115kV Transmission Line

OTHER
- Pipeline
- Fiber Optic Line
- No Existing Utility Lines

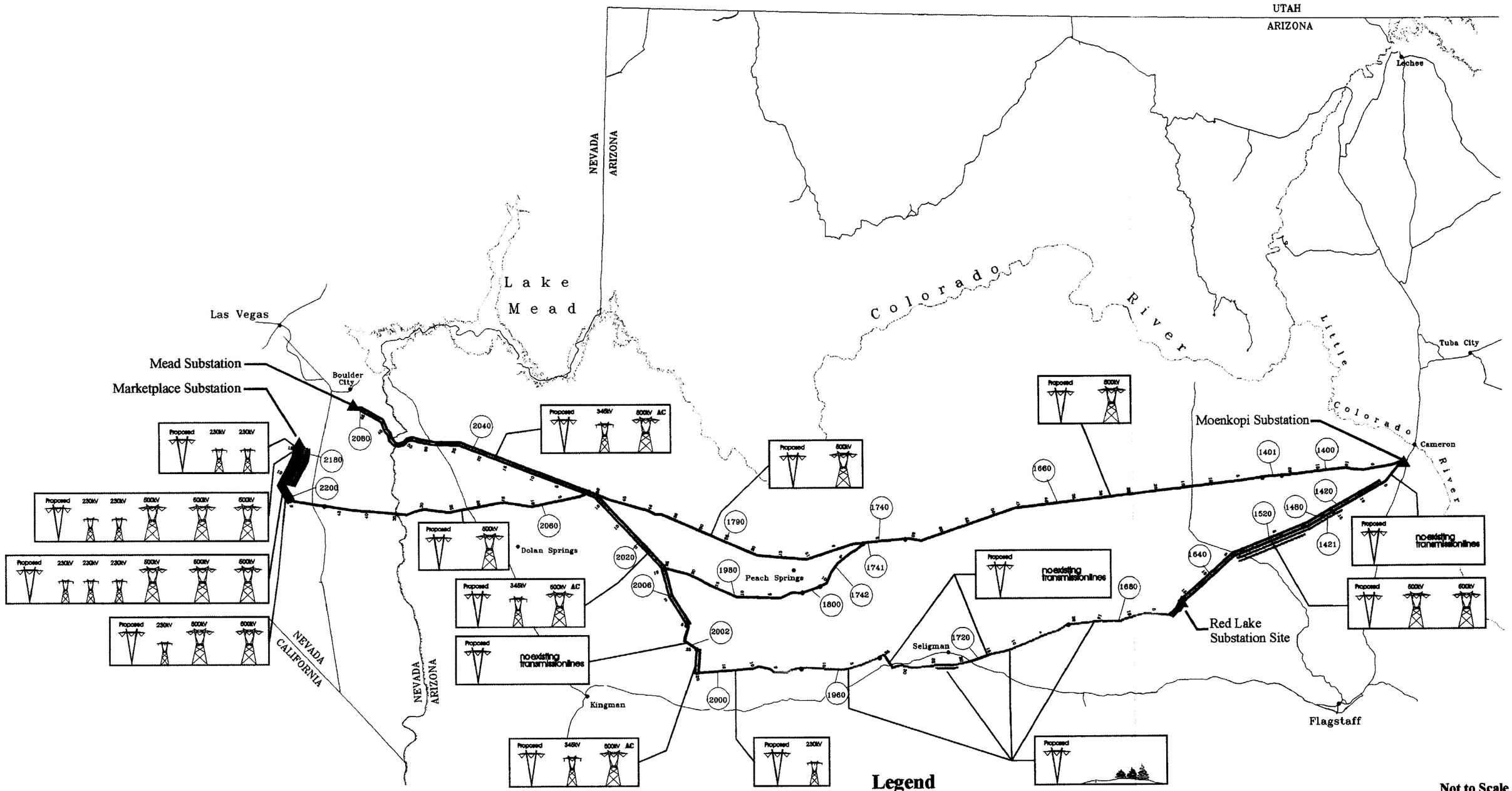
Not to Scale
(mileposts are approximate)

Existing Utility Corridors

Eastern Area

Navajo Transmission Project

Figure 3-3



Legend

TRANSMISSION LINES
- 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- 115kV Transmission Line

OTHER
- Pipeline
- Fiber Optic Line
- No Existing Utility Lines

Not to Scale
(mileposts are approximate)

Notes: 1) The figure illustrates only existing utility corridors paralleled by NTP alternative routes.
2) The proposed structure for NTP is V-shaped, guyed, single-pedestal, steel lattice as illustrated in this figure. However, in many locations NTP structures would be constructed to match structures along existing transmission lines to minimize visual impacts.
3) The tower illustrations are schematic and relationships between existing and proposed towers are representative only (particularly in corridors containing multiple lines).

Existing Utility Corridors

Western Area

Navajo Transmission Project

Figure 3-4

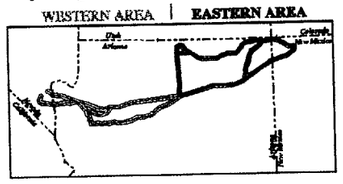
Legend

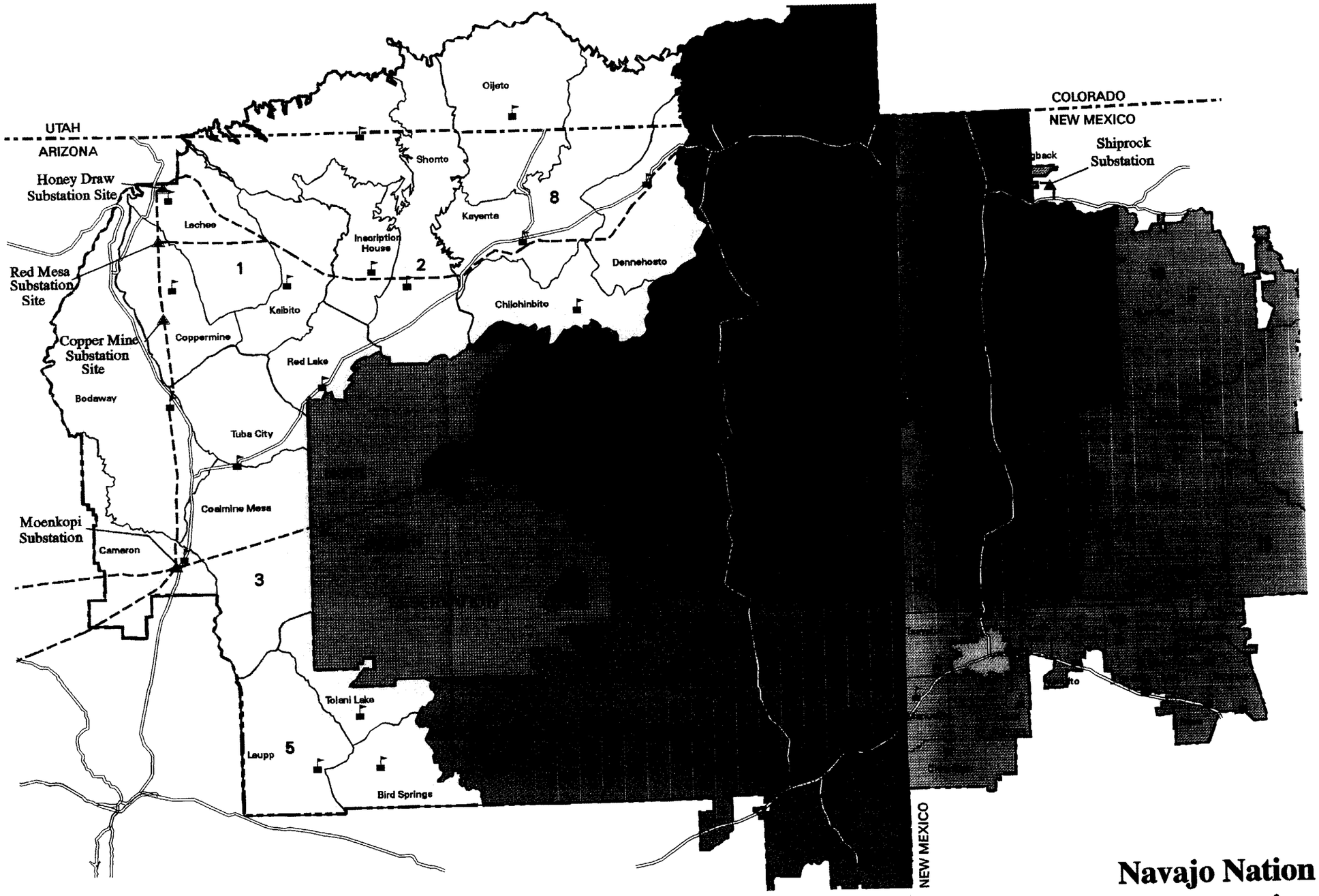
- Chinle Agency
- Crownpoint Agency
- Fort Defiance Agency
- Shiprock Agency
- Tuba City Agency
- Hopi Indian Reservation
- Gallup
- Navajo Indian Reservation Boundary
- Chapter Boundary
- Agency Boundary
- Alternative Routes
- State Boundary
- Grazing District Boundary
- 6 Grazing District Number
- Chapterhouse Locations
- Substations

N

1:1,250,000

Key Map





Navajo Nation Chapters, Agencies, and Grazing Districts

Navajo Transmission Project

Figure 3-5

Future Land Use—The intent of the future land use component was to inventory planned and proposed land uses and provide a general representation of how future development may occur. Future uses were identified where available from (1) projected uses documented in general and comprehensive plans; (2) recorded, specific development plans; and (3) zoning. Generally, the Federal agency management plans and community plans indicate that the agencies and communities will continue to manage their respective areas primarily for the rural, open space character, allowing for compatible uses.

Parks, Preservation, and Recreation—Recreational uses along the alternative routes include one national recreation area (Lake Mead NRA), two BLM ACECs (The Hogback and Black Mountain), a limited number of developed recreation facilities (e.g., campgrounds, trails, picnic areas), and areas of dispersed recreation (e.g., hiking, off-road vehicle activities), as shown on Figures MV-9E and MV-9W.

ALTERNATIVES

The results of the land use inventory are summarized below for each alternative route, substation, and the communication site. Figures MV-7E through MV-9W illustrate land uses within a six-mile-wide corridor. The tables in Appendix E provide supplemental information.

Eastern Area Transmission Line Alternatives

Glen Canyon 1 (GC1)

New Mexico

Linear Features—GC1 parallels Western's existing Shiprock-to-Glen Canyon 230kV transmission line west from the Shiprock Substation for the entire distance along Links 100, 120, and 460. GC1 crosses two pipelines and one transmission line, as well as two Tribal Routes and U.S. Highway 666.

Land Jurisdiction—BLM land (3.6 miles) and Navajo Nation land (31.3 miles) is crossed by GC1. On the Navajo Nation, GC1 crosses portions of The Hogback, Shiprock, Cudei, Beclahbito, and Teec Nos Pos chapters within the Shiprock Agency.

Existing Land Use—There are no residences within 500 feet of the reference centerline of GC1 in New Mexico, and agricultural lands along the San Juan River near Waterflow are avoided. Grazing is the dominant land use on Navajo lands.

Parks, Preservation, and Recreation—GC1 (Link 100) would cross approximately 3.6 miles of The Hogback ACEC, an area designated to protect and preserve unique and rare plant species.

Arizona

Linear Features—GC1 continues to parallel Western's Shiprock-to-Glen Canyon 230kV line along Links 460, 461, 580, 581, 586, and 587. A new corridor would be established in the Marsh Pass area (Links 463, 501, 502, 504, and 561) in order to avoid Monument Valley Tribal Park. West of the Navajo Generating Station, GC1 parallels Nevada Power Company's 500kV line along Link 620. Links 621 and 627 would require a new corridor across the city of Page and in the Lechee area. The remainder of GC1 parallels Western's two Glen Canyon-to-Pinnacle Peak 345kV lines to the Moenkopi Substation along Links 1389, 1393, 1397, 1383, 1384, and 1386.

Major transportation routes are crossed 16 times (seven U.S. highway crossings, three state highway crossings, and six tribal route crossings). In addition, there are two crossings of pipelines and four crossings of high-voltage transmission lines.

Land Jurisdiction—GC1 crosses the Navajo Nation for 223.8 miles in Arizona, including portions of the Teec Nos Pos, Red Mesa, and Mexican Water chapters within the Shiprock Agency; and the Dennehotso, Kayenta, Chilchinbito, Shonto, Inscription House, Kaibito, Lechee, Copper Mine, Tuba City, Bodaway, and Cameron chapters within the Tuba City Agency. Private and municipally owned lands are located within the Page city limits.

Existing Land Use—There is a dispersed pattern of approximately 21 residences within 500 feet of GC1. Residences in proximity to GC1 are along existing transmission lines (Links 461, 580, 581, 587, 1389, 1393, and 1397); roads, including U.S. 160 (Link 461), Tribal Route 22a and State Route 564 (Link 580), and State Route 98 (Link 587); near towns including Red Mesa and Mexican Water (Link 461), Dennehotso (Link 463), Shonto (Link 580), and The Gap (Link 1383). Other towns that are near GC1 include Teec Nos Pos (south of Link 460), Kayenta (north of Links 502 and 504), Tsegi (north of Link 561), Lechee (south of Link 621), Copper Mine (east of 1393), and Cameron (east of Link 1386).

Future Land Use—The city of Page has lands designated for industrial and open space uses along Links 620 and 621. The Dennehotso Chapter has identified plans for a potential housing development across from the chapter house in Dennehotso, and the Teec Nos Pos Community Planning Area recommends mixed use development in the area of Link 460 where a small commercial tourist-related facility has been proposed.

Parks, Preservation, and Recreation—Commercial recreational sites within approximately 0.5 mile of Link 621 include a shooting range operated by the Page Gun Club within the Page city limits, and a facility for radio-controlled airplanes adjacent to the shooting range. The Great Western Trail, a multiple-use recreational trail proposed to extend from Canada to Mexico, is crossed by Link 1397 north of The Gap. The Shonto rodeo arena, located north of town, is adjacent to GC1 along Link 580.

Kaibito 1 (K1)

New Mexico

The New Mexico portion of K1 is the same as GC1.

Arizona

The Arizona portion of K1 is the same as GC1 except for the use of Links 1390 and 1391 across the Kaibito Plateau (which replace Links 587, 620, 621, 627, and 1389 on GC1).

Linear Features—A new transmission line corridor would be established along Links 1390 and 1391. In this area, similar to GC1, there is one crossing of State Route 98 and Tribal Route 20, and crossings of three high-voltage transmission lines (Links 1390 and 1391). In contrast to the GC1 route, K1 avoids crossing these high-voltage lines and roads near the city of Page.

Land Jurisdiction—This segment of K1 crosses the Navajo Reservation for the entire length. Navajo agencies and chapters crossed along this alternative are the same as GC1.

Existing Land Use—Few residences are dispersed along Links 1390 and 1391 across the Kaibito Plateau, and none were identified within approximately 500 feet of the reference centerline. The dominant existing land use along Links 1390 and 1391 is grazing.

Parks, Preservation, and Recreation—No parks, preservation, or recreational uses were identified along this segment of K1.

Central 1 (C1)

New Mexico

Linear Features—C1 parallels two TEP 345kV lines along Links 240, 300, and a portion of 360, and an APS 500kV transmission line along Link 700. Two U.S. highways, one tribal route, and five pipelines are crossed.

Land Jurisdiction—Lands surrounding and south of the Shiprock Substation are administered by BLM, where 2.1 miles are crossed by Links 180 and 240. Privately owned lands are located along Link 240 (1.7 miles) north of the San Juan River crossing. The remainder of the alternative in New Mexico is on the Navajo Reservation (36.4 miles). Within the Shiprock Agency, the San Juan, Nenahnezad, Sanostee, Shiprock, Red Valley, and Cove chapters are crossed.

Existing Land Use—Existing land uses include residential, agricultural, and rangeland for grazing. Seven residences are found in an area along Link 240 near the San Juan River, and seven residences are dispersed along Link 700 east of the Chuska Mountains within the 500-foot-wide corridor. Oil wells are also located within the vicinity of the alternative route near The Hogback.

Parks, Preservation, and Recreation—C1 crosses The Hogback ACEC, which is designated to protect unique and rare plant species that are listed as threatened and endangered (Links 180 and 240).

Arizona

Linear Features—C1 parallels an APS 500kV transmission line for the entire length of the alternative along Links 700, 701 and 780 into the Moenkopi Substation. There are a total of 12 crossings of major transportation routes. Link 700 crosses one U.S. highway and two tribal routes. Link 780 crosses one U.S. highway, one state highway, and tribal routes seven times. In addition, Link 780 crosses two pipelines and one high-voltage transmission line.

Land Jurisdiction—The Navajo Nation is crossed along Links 700, 701, and 780 (114.3 miles), and Hopi lands would be crossed along Link 780 (33.1 miles). This alternative would cross the Red Valley and Cove chapters of the Shiprock Agency; the Round Rock, Lukachukai, Many Farms, Chinle, Tselani/Cottonwood, Tachee/Blue Gap, Whippoorwill Spring, Piñon, and Hard Rocks chapters of the Chinle Agency; and the Coalmine Mesa and Cameron chapters of the Tuba City Agency of the Navajo Nation.

Existing Land Use—Land uses include residential, agricultural, timber management, rangeland for grazing, and industrial. The dominant use is livestock grazing. Eighteen residences are located along the alternative. Heavier residential concentrations within the six-mile-wide study corridor are located on the western side of the Chuska Mountains near the community of Lukachukai (Link 700); along U.S. 191 between Many Farms and Chinle (Link 700); in the Burnt Corn Valley (Link 780); along Tribal Route 4 (Link 780); and near Hard Rocks and Dinnebito (Link 780). On American Indian lands, Navajo and Hopi settlements and rural residences typically have small agricultural fields maintained for personal subsistence. Industrial uses include oil production (wells) in and near the Chuska Mountains, and uses associated with agriculture.

Link 700 crosses timber management areas (Navajo Compartments 32 and 33) in the Chuska Mountains for a distance of about seven miles in an existing transmission line corridor. Harvestable ponderosa pine is found for a distance of approximately 2.1 miles along C1 in this area. Although currently inactive, commercial logging has taken place in the Chuska Mountains, and areas have been cleared for development by oil extraction facilities and the existing APS transmission line.

East of Cameron near the crossing of the Little Colorado River (Link 780), there are some excavations that are reported to be reclaimed uranium mines, portions of which may be located within the right-of-way.

Future Land Use—No planned or proposed uses were identified along C1 on the Navajo Nation. The Hopi Comprehensive Development Plan, adopted in 1988, identifies one community development near C1 in the vicinity of Hard Rocks. This development is called the Turquoise Community Development and is under construction outside the right-of-way of C1 (Link 780). The Hopi development plan also indicates that future use along the alternative (Link 780) is designated for livestock grazing and commercial development near Arizona State Route 264.

Parks, Preservation, and Recreation—The Great Western Trail would be crossed by Link 780.

Central 2 (C2)

New Mexico

The New Mexico portion of C2 is the same as GC1 and K1.

Arizona

The Arizona portion of C2 varies from C1 by passing to the north and west of the Chuska Mountains along Link 460 near Teec Nos Pos and Link 462 in the Chinle Valley and across Carson Mesa. The portion of C2 from the Lohali Mesa area west to the Moenkopi Substation along Link 780 is the same as C1.

Linear Features—With the use of Link 462 across Carson Mesa and through the Chinle Valley, a new transmission corridor would be established. Along the Arizona portion of Link 460, C2 parallels Western's Shiprock-to-Glen Canyon 230kV line. Along Links 460 and 462 there are five crossings of major transportation routes (three U.S. highways and two tribal routes).

Land Jurisdiction—The Arizona portion of C2 crosses the Navajo Nation along Links 460 and 462. Link 460 and Link 462 cross the Teec Nos Pos, Sweetwater, and Rock Point chapters of the Shiprock Agency and the Rouch Rock Chapter of the Chinle Agency.

Existing Land Use—Existing land uses include residential and grazing along the western portion of Links 460 and Link 462. One residence was identified along the western portion of Link 460 within 500 feet. A total of 10 residences were identified with 500 feet for the entire C2 route. Grazing is the dominant use.

Future Land Use—The only other planned or proposed land use identified was in the area of Teec Nos Pos. The Teec Nos Pos Community Planning Area recommends mixed use development in the area of Link 460; a small commercial tourist-related facility has been proposed.

Substation Alternatives

Shiprock Substation—The existing Shiprock Substation is owned by Western and is surrounded by land administered by BLM. The use at the substation is industrial, associated with operation and maintenance of the transmission lines. The substation is surrounded by The Hogback ACEC, designated to protect unique and rare plant species. Use in the immediate vicinity of the substation is grazing. No other uses exist or are planned in proximity to the substation.

Honey Draw Substation Site—This site is located on the Navajo Nation, south of Page, within the boundaries of the Lechee Chapter in an area known as Honey Draw. The only existing or planned land use in the area is grazing.

Red Mesa Substation Site—This site is located approximately 10 miles south of Page along Link 1389. The site falls within the boundaries of the Copper Mine Chapter and is approximately six miles northwest of the community of Copper Mine. The predominant land use in the area of the site is grazing. No other existing or planned land uses were identified in the immediate vicinity.

Copper Mine Substation Site—The site is located approximately 25 miles south of Page along Link 1393, just north of the Bennett Freeze area. The site falls within the boundaries of the Copper Mine Chapter. The primary land use in the area is grazing, with scattered residences in the vicinity.

Moenkopi Substation—The site is located near the existing Moenkopi Substation on the Navajo Nation. The use is industrial, associated with the operation and maintenance of transmission lines, and the land use in the area of the site is grazing. No other existing or planned land uses were identified in the immediate vicinity of the substation site.

Western Area Transmission Line Alternatives - Moenkopi to Marketplace

Northern 1 West (N1W)

Arizona

Linear Features—N1W parallels an APS 500kV transmission line along the entire route in Arizona. There are 12 crossings of major transportation routes. Link 1660 crosses one U.S./State highway and one county road (twice). Link 1790 crosses county roads or tribal routes six times. The eastern portion of Link 2060 crosses two county roads and one U.S. highway. In addition, two high-voltage transmission lines are crossed along the eastern portion of Link 2060.

Land Jurisdiction—Along the Arizona portion of N1W, land jurisdictions include Federal, state, Navajo Nation, Hualapai Tribe, and private. West of the Moenkopi Substation area, the Cameron Chapter of the Tuba City Agency of the Navajo Nation is crossed by Link 1400. The Kaibab National Forest is crossed for about 19.1 miles on Links 1400, 1401, and 1660. Mixed state and private land is crossed by Links 1660, 1740, and 1741. Some of the private land is an area known as the Big Boquillas Ranch, much of which is owned by the Navajo Nation, and adjacent state lands are leased to the Navajo Nation. Hualapai lands are crossed by Link 1790 (35.1 miles). West of the Hualapai lands, the majority of land along Link 1790 is administered by BLM. Along Link 2060, jurisdiction includes mixed (checkerboard) BLM and private lands, and lands administered by the NPS at the Lake Mead NRA. The BLM Kingman Resource Area Draft Resource Management Plan (1993) includes a list of lands proposed for disposal northeast of Dolan Springs (Link 2020).

Existing Land Use—N1W parallels an existing transmission line, which is a designated utility corridor across the Federally administered lands. No residential uses were identified within approximately 500

feet of N1W. The only residential concentration near N1W is on the subdivided land south of Link 2060 and northeast of Dolan Springs. The dominant land use is livestock grazing. The land-managing agencies (Forest Service, BLM, and Hualapai Tribe) have divided rangelands in the region into grazing allotments to facilitate the management of the land for livestock grazing. Much of the private land and state trust lands are also open range. An airstrip was identified approximately 0.5 mile south of Link 1790, near Frazier Well Road. Within the Kaibab National Forest, the majority of lands crossed consist of piñon-juniper woodlands, which are not suitable for harvest.

Future Land Use—No planned or proposed land uses were identified in the immediate vicinity of N1W. In Coconino County, lands along N1W are zoned for rural residential or agricultural residential, but no plans for development were identified. In Mohave County, Link 2060 crosses or is adjacent to private subdivided lands (near Dolan Springs, Lake Mohave Ranchos, and Keno Ranches), but there are no specific plans for development.

Parks, Preservation, and Recreation—A number of areas, either preservation or recreation, are crossed by the Arizona portion of N1W in the existing utility corridor. On lands administered by the Forest Service, N1W (Link 1400) crosses areas classified as "semi-primitive non-motorized," areas characterized by predominantly unmodified natural environment with no motorized use allowed. Also, the Arizona Trail is crossed on the Kaibab National Forest by Link 1401. BLM's Black Mountain ACEC, located northwest of Kingman, is crossed by Link 2060 for approximately three miles. BLM is proposing 219,428 acres for the ACEC, which provides habitat for special status wildlife and plants, contains prehistoric and historic cultural resources, and offers recreation activities such as hunting, camping, picnicking, and nature viewing. The Grand Canyon Railroad, carrying tourists from Williams to the Grand Canyon, is crossed by N1W along Link 1660. Link 1790 crosses the proposed Music Mountains Crest Trail. Link 2060 to the west crosses the Lake Mead NRA for about 6.5 miles. The NRA offers land and water recreation activities; however, the most popular recreation uses in the area of N1W are water sports (e.g., boating, fishing, swimming, water skiing).

Nevada

Linear Features—N1W parallels the APS 500kV line along Link 2060 and a portion of Link 2200. As Link 2200 approaches the Marketplace Substation in the Eldorado Valley, two additional 500kV lines and three 230kV lines are paralleled until their termination point at Marketplace. One U.S. highway, three high-voltage transmission lines, and one fiber optic cable is crossed.

Land Jurisdiction—The Nevada portion of N1W crosses primarily three jurisdictions—NPS, BOR, and BLM. Link 2060 crosses NPS-administered Lake Mead NRA for about 4.4 miles, 0.4 mile of which is land that was withdrawn by BOR for purposes of power-facilities development.

Existing Land Use—N1W parallels an existing transmission line, which is in a designated utility corridor. The primary land use is livestock grazing on BLM-administered land. Residences were not identified within approximately 500 feet of the reference centerline of alternative N1W.

Future Land Use—No planned or proposed land uses were identified along N1W.

Parks, Preservation, and Recreation—Link 2200 crosses the Eldorado Valley Transfer Area, which Boulder City plans to use for recreation, open space, a desert tortoise preserve, and a solar-power peaking station. Parks, preservation, and recreation areas in the vicinity of this route include the Lake Mead NRA (Link 2060). The BLM Ireteba Peaks Wilderness Study Area (WSA) is located adjacent to and south of Link 2060 in Clark County.

Northern 2 (N2)

Arizona

The Arizona portion of N2 is the same as N1W with the exception of Links 1742, 1800, 1980, and 2020, which are located to the south of the Hualapai Indian Reservation (and replace Link 1790 on N1W).

Linear Features—Links 1742, 1800, and 1980 are not in an existing utility corridor. Link 2020 parallels existing 345kV and 500kV lines. In this area N2 crosses a total of three major transportation routes—two U.S. highways, and one county road. Links 1742 and 1980 each crosses U.S. Route 66 once. Also, there are two crossings of a fiber optic cable along Link 1980.

Land Jurisdiction—Link 1742 crosses lands of mixed (checkerboard) state and private ownership. Some of the private land along Link 1742 is owned by the Navajo Nation. BLM-administered land is along Links 1980 and 2020. In the area west of the Music Mountains, the land-ownership pattern is mixed (checkerboard) BLM and private. The BLM Kingman Resource Area Draft Resource Management Plan (1993) includes a list of lands proposed for disposal northeast of Dolan Springs (Link 2060). Link 1980 (new corridor) also crosses private land owned by the Hualapai Tribe.

Existing Land Use—One residence is located within approximately 500 feet of Link 1980 near Route 66. The primary existing land use is grazing. The land-managing agencies have divided the rangeland into grazing allotments to facilitate management of grazing.

Future Land Use—Similar to the areas along N1W, areas along N2 are zoned for rural residential or agricultural residential but no development plans were identified. Link 2020 crosses or is adjacent to private subdivided land west of the Music Mountains, but there are no specific plans for development.

Parks, Preservation, and Recreation—Park, preservation, and recreation uses include historic Route 66 crossed by Links 1742 and 1980, historic Beale Wagon Road crossed by Link 1980, and the proposed Music Mountains Crest Trail crossed by Link 1980.

Nevada

The Nevada portion of N2 is the same as N1W.

Southern 2 (S2)

In Arizona, S2 varies from N2 beginning at the Moenkopi Substation and continuing west through Link 2006. At this point, S2 is then the same as N2 proceeding north and west along Links 2020 and 2060 to the crossing of the Colorado River and the Nevada border.

Arizona

Linear Features—S2 parallels two APS 500kV lines along Links 1420, 1480, 1520, 1640, and a small portion of 1680. Along Links 1680, 1720, 1960, and 2000, S2 parallels a variety of fiber optic lines and pipelines. Along a portion of Link 2000, and along Link 2006, S2 parallels a Western 345kV line and a Salt River Project (SRP) 500kV line.

There are 11 crossings of major transportation routes along this portion of S2. Links 1640, 1680, 1720, and 2000 cross one interstate highway (twice), two U.S. highways (three times), one state highway, and five county roads. In addition, Links 1640, 1720, 1960, and 2000 would cross 11 pipelines, 4 fiber optic lines, and 4 high-voltage transmission lines.

Land Jurisdiction—Land jurisdictions along this portion of S2 include Navajo Nation, Forest Service, BLM, state of Arizona, and private. West from the Moenkopi Substation area, S2 crosses the Cameron Chapter of the Tuba City Agency of the Navajo Nation along Links 1420 and 1421. Mixed (checkerboard) state (56.1 miles) and private lands are crossed intermittently along Links 1421, 1480, 1520, 1640, 1680, 1720, 1960, 2000, and 2002. BLM and private lands are crossed by Links 2002 and 2006. The Kaibab National Forest is crossed by portions of Links 1640 and 1680.

Existing Land Use—Existing land uses along S2 include residential, rangeland used for grazing, agricultural, and industrial. Seven residences were identified within approximately 500 feet along Links 1420, 1960, and 2006. Within the six-mile-wide study corridor, heavier residential concentrations are located near Seligman north of Link 1720, Hackberry (Link 2002), and Antares (Link 2006). An airstrip was identified at the base of the Cottonwood Mountains, southeast of Hackberry about 0.5 mile from Link 2000.

Future Land Use—No planned or proposed developments were identified along the Arizona portion of S2. Designated utility corridors exist where S2 parallels existing transmission lines across Federal lands. Private lands in Coconino County are zoned rural residential and agricultural residential, and are expected to remain rural in character with very low density residential use. In Mohave County, Link 2020 crosses or is adjacent to planned subdivisions, but there are no specific plans for development. Portions of Links 1640 and 1680 cross the Red Lake area north of Williams, Arizona. According to the Red Lake Area Plan, developed by the Red Lake Planning Committee, the unsubdivided private land in the project area is primarily zoned "General," 10-acre minimum parcel size, which allows one dwelling per parcel.

Parks, Preservation, and Recreation—A proposed section of the Arizona Trail is crossed by Link 1480, Link 1640 crosses the San Francisco Peaks Scenic Road, and Link 1680 crosses the historic Beale Wagon

Road and the Grand Canyon Railroad. Historic Route 66 is crossed by Link 1720 southeast of Seligman and north of Hackberry on Link 2006.

Link 2002 crosses another segment of the Beale Wagon Road.

Nevada

The Nevada portion of S2 is the same as N1W and N2.

Western Area Transmission Line Alternatives - Moenkopi to Mead

Northern 3 (N3), Northern 4 (N4), Southern 4 (S4)

Alternatives N3, N4, and S4 are identical to alternatives N1W, N2, and S2, respectively, with the exception of Links 2040 and 2080, which connect into the Mead Substation rather than the Marketplace Substation (replacing Links 2060, 2200, and 2180). The following description focuses on Links 2040 and 2080. The following land use discussions focus on descriptions of Links 2040 and 2080.

Arizona

Linear Features—Link 2040 parallels an SRP 500kV line and a Western 345kV line. One U.S. highway and four county roads would be crossed Link 2040. Also, there are two crossings of a coaxial cable.

Land Jurisdiction—Land ownership along Link 2040 is mixed (checkerboard) with BLM, private lands, and a small area of state land in the Detrital Valley. Unincorporated private lands in this area are under the administration of Mohave County. The NPS-administered Lake Mead NRA is crossed by Link 2040 (7.2 miles).

Existing Land Use—Existing land use identified along Link 2040 consists of livestock grazing. No residences were identified within 500 feet along the entire route.

Parks, Preservation, and Recreation—Link 2040 crosses the Lake Mead NRA for 7.1 miles in Arizona. The Willow Beach Marina, National Fish Hatchery, and Willow Beach overlook are located within the land use study corridor, but are not in the immediate vicinity of Link 2040.

Nevada

Linear Features—An SRP 500kV line and a Western 345kV line are paralleled along Link 2040. Several high-voltage transmission lines pass through the area near the Mead Substation terminus, two of which would be crossed by Link 2040.

Land Jurisdiction—Link 2040 crosses NPS-administered Lake Mead NRA for about 9 miles, 2.8 miles of which are in a BOR power withdrawal. Just east of the Mead Substation, Link 2040 crosses BOR-administered land (1.8 miles).

Existing Land Use—Existing land use along Link 2040 in Nevada is limited. Link 2040 parallels two existing transmission lines, which are located in an NPS-designated utility corridor across the Lake Mead NRA, and terminate at the Mead Substation.

Future Land Use—At the western end of Link 2040 near the Mead Substation, the Boulder City Master Plan indicates plans for a new airport, public, quasi public, residential, and commercial uses; however, Link 2040 would not be adjacent to or cross any of these.

Parks, Preservation, and Recreation—Lake Mead NRA proposes the recreational Canyon-Rim Trail along the rim of the Black Canyon, which is crossed by Link 2080. The trail will start at the NPS Visitor Center and terminate about 20 miles south in the area of the Eldorado Canyon Road. Several recreational facilities were identified within alternative study corridors near Boulder City, but none are crossed by or adjacent to Links 2040 and 2080.

Substation Alternatives

Red Lake Substation Site—The site is located on Arizona state trust lands. Existing land uses in the vicinity of the site are limited primarily to livestock grazing. No other uses were identified within one-quarter mile of the site. Future land use in the general area is planned as rural residential. The substation site is located within the Red Lake Planning Area. Unsubdivided private land in the vicinity of the project area is primarily zoned General (e.g., 10-acre minimum parcel size), which allows one dwelling per parcel. No parks, preservation, or recreation uses were identified in the immediate vicinity.

Marketplace Substation—The Marketplace Substation is located within the boundaries of Boulder City. Land use at the substation is industrial, associated with operation and maintenance of the transmission lines. The surrounding area is used for livestock grazing. No planned or proposed land uses, parks, preservation, or recreation uses were identified in the immediate vicinity of the Marketplace Substation.

Mead Substation—The Mead Substation, south of Boulder City, is owned and operated by Western. Lands surrounding the substation are administered by BOR. Use at the substation is industrial, associated with operation and maintenance of transmission lines. The surrounding area is used for livestock grazing. No other uses were identified within one-quarter mile of the substation. No planned or proposed land uses, parks, preservation, or recreation uses were identified in the immediate vicinity of the Mead Substation.

Microwave Communication Facility

The existing Bill Williams Mountain communication site is administered by the Kaibab National Forest and is within the Bill Williams Peak off-road vehicle closure area. The Forest Service classifies the

general use of the area as roaded and natural. Recreation activities that take place in the vicinity of this site include hunting, fishing, dispersed camping, sightseeing, cross country skiing, and hiking.

SOCIOECONOMICS

This section presents the social and economic characteristics of the people and communities in the vicinity of NTP's alternative routes and facilities. The following discussion addresses the data inventoried including general data regarding state, county, and American Indian communities; and provides a general overview of the state, county, and American Indian populations socioeconomic conditions.

INVENTORY DATA

State and County (Non-American Indian)

Detailed statistics on demographic, social, and economic characteristics of each county were compiled for the study, including population by sex, race, and age; family income and poverty status; labor force and employment (by industry and by occupation); housing tenure and conditions; and fiscal conditions.

The socioeconomic studies used a wide variety of sources, primarily governments and academic institutions, with emphasis on local area social and economic conditions. The decennial censuses by the Federal government; periodic regional and local economic surveys by Federal, state, and county governments; and studies by academic and private research organizations provided a myriad of time-series data on demographic and economic trends in counties and regions. Institutions contacted and other sources of data on general state, county, and city socioeconomic characteristics are listed in Chapters 5 and 6. Statistical abstracts from each state as well as comprehensive annual financial reports for each county and the two cities (Page and Boulder City) in the project area were obtained. Baseline economic data sets for each county were provided from the Minnesota IMPLAN Group. Summaries of the information are included in the overview of the project area.

American Indian Communities

Alternative routes cross the Navajo, Hopi, and Hualapai reservations and lands occupied by the San Juan Southern Paiute tribe. Specific communities were selected for the inventory based on their distance from the alternative routes and availability of socioeconomic data. All of the selected communities fall within 20 miles of the alternative routes, and are located at an average distance of five miles from alternative routes.

Data collection consisted of a review of public documents and other sources. Most of the material was obtained from the Government Documents library at Arizona State University and the University of New Mexico. Tribal planning agencies were contacted for specific data on tribes. The Navajo recommended the following three publications:

- *1990 Census, Population and Housing Characteristics of the Navajo Nation (Division of Community Development, Navajo Nation 1993)*
- *Chapter Images: 1992 Edition (Division of Community Development, Navajo Nation 1993)*
- *Navajo Nation FAX (Division of Economic Development, Navajo Nation 1994)*

A listing of all agencies and other knowledgeable persons that were contacted is provided in the summary of agencies consulted (Table 5-2 in Chapter 5).

OVERVIEW

States and Counties

The seven counties in which alternative routes could be located had an aggregate population of 1.27 million at the time of the 1990 census and, according to state and Federal projections, would reach 1.57 million in 1995 and 1.78 million by the year 2000. This projected growth represents an average growth rate of 3.4 percent per year for the project region; in fact, this growth is skewed by the higher rates projected for the western counties of Mohave, Arizona, and Clark, Nevada (at 4.2 and 3.5 percent per year, respectively), offsetting slower population growth rates in the other more rural counties that make up the eastern and central portions of the region (San Juan—1.3 percent per year; Apache—1.6 percent; Navajo—1.4 percent; Coconino—2.1 percent; Yavapai—2.7 percent) (Statistical Abstracts for Arizona, Nevada, and New Mexico 1993/1994 and Bureau of the Census 1994).

A review of comparative demographic, social, and economic data for the seven counties reinforces the picture of a lower income, rural socioeconomic setting dominating the eastern half of the project area, while the western half shows greater economic vitality and diversity. Data for the counties were compiled that compare such indicators as population, occupation, housing tenure and facilities, per capita expenditures, tax revenues, and such measures of income as household and per capita income, percent of persons and families below the poverty level, and level of unemployment. The counties of San Juan, Apache, Navajo, and, to a lesser extent, Coconino have the highest proportions of American Indian residents and the highest incidences of economic dependency and distress in the project area.

The primary indicators of the socioeconomic health of a community are income, employment, dependency (numbers of below- and above-working age residents), and household size. Virtually all of San Juan County's indicators are lower than the statewide New Mexico averages, as is the case with the two most easterly Arizona counties (Apache and Navajo) relative to Arizona statewide averages. To a lesser extent, Coconino County's indicators fall below the Arizona statewide average, but are uniformly higher than its eastern neighbors. Arizona's Yavapai and Mohave counties show the impact of high percentages of retirement age residents: somewhat lower per capita incomes relative to the statewide average, but significantly lower poverty percentages and higher home values and educational attainments than their eastern neighbors. Finally, Clark County reflects the southern Nevada boom in gaming, tourism, and industrial development in its levels of income, employment, housing value, and educational attainment.

American Indian Populations

This section describes the socioeconomic environment of the Navajo, Hopi, Hualapai, and San Juan Southern Paiute populations in the vicinity of the project alternatives, and Navajo chapter services. Table 3-4 presents an overview of the various tribes present in the area.

Hopi

The Hopi Reservation is located in north-central Arizona, and covers 1,561,213 acres. Nearly 80 percent of the reservation is in Navajo County, with only Moenkopi, Coal Mine Mesa, and Sand Springs located in Coconino County.

Between 1970 and 1990, the population on the Hopi Reservation expanded from 4,966 to 9,199 residents (an 8.5 percent increase overall). This increase may be related to increased job opportunities in neighboring communities such as Flagstaff. In 1989, 61 percent of the Hopi labor force was unemployed. The median household income was $14,325, with 52.5 percent based on a mix of social security, public assistance, and retirement benefits. Per capita income on the reservation was $4,953 in 1989, with 48.2 percent of the people living below the poverty level. Housing statistics showed an average of 3.3 persons per household in 1990. Data on kitchen facilities and plumbing for these households were not available, and data on electricity were available only for Coconino County. Ten percent of Hopi houses in Coconino County had electric power in 1990, and 77 percent of the houses on the Hopi Reservation used wood or gas for fuel.

The economic base of the Hopi rests on subsistence agriculture, some manufacturing (e.g., artisan industry), tourism, and government. Education, health services, government administration, and livestock grazing provide most of the jobs on the reservation.

Data on the public finances (sources and uses of public funds) of the Hopi were not available.

Hualapai

The Hualapai Reservation is located in northwestern Arizona and covers 992,463 acres predominantly in Mohave and Coconino counties, with a very small portion in northwestern Yavapai County. The number of residents on the reservation is relatively small—682 in 1970, rising to 1,498 by 1990.

In 1990, 54.7 percent of the Hualapai labor force was unemployed. Median household income was $11,071 in 1989 while per capita income was $3,711. Fifty-five percent of the population was below the poverty level, while 52.5 percent of the households were receiving supplemental income from Social Security, public assistance, or retirement benefits. Housing statistics indicate an average of 3.8 persons per household. Data on kitchen facilities and plumbing for these houses were not available. The available data indicate that 7.2 percent of the houses on the reservation had electricity in 1990, while wood and gas were used in 77 percent of Hualapai households.

TABLE 3-4
DISTRIBUTION OF AMERICAN INDIAN TRIBES IN THE PROJECT AREA

	Navajo	Hopi	Hualapai	San Juan Southern Paiute
State	Arizona, New Mexico	Arizona	Arizona	Arizona
County	San Juan, New Mexico; Apache, Navajo, Coconino, Arizona[1]	Navajo, Coconino, Arizona	Mohave, Coconino, Yavapai; Arizona	Coconino
Principal Communities in the Reservations	Shiprock, New Mexico; Window Rock, Fort Defiance, Lukachukai, Chinle, Rock Point, Kayenta, Lechee, Tonalea, Tuba City	Moenkopi, Kykotsmovi, Oraibi, Bacavi, Shungopavi, Shipalovi, Mishongovi, Polacca, Walpi, Sichomovi, Hano, Lower Moenkopi	Peach Springs	Tuba City
Acreage, 1991[2]	14,775,066 in Arizona; 2,329,600 in New Mexico	1,561,213 (Arizona)	992,463 (Arizona)	NA
Population Trends[3]				
1970	95,104	4,966	682	NA
1980	140,984	8,253	988	NA
1990	155,276	9,199	1,498	NA
1996	not available	9,607	2,033	250
Primary Economic Base	livestock, mining, manufacturing, tourism	livestock, mining, manufacturing, tourism	livestock, tourism	NA

(1) McKinley (New Mexico) and San Juan (Utah) counties included in Navajo Reservation lands outside NTP area.
(2) Source: Arizona Commission on Indian Affairs, in Arizona Statistical Abstract (University of Arizona 1993).
(3) Sources: Navajo - 1970—U.S. Census from Navajo Nation FAX statistical abstract (Navajo Nation Division of Economic Development 1994), New Mexico Trust Lands population excluded until 1980 Census; 1980 and 1990—Census of total population in Chapter Images: 1992 Edition (Navajo Nation 1993). Hopi and Hualapai—Arizona Commission on Indian Affairs, from Arizona Statistical Abstract (University of Arizona 1993). 1996 data from BIA Phoenix Agency Office.
NA The San Juan Southern Paiutes were formally recognized by the Federal government as a tribe in 1990. Reservation lands have not been assigned.

The Hualapai's economic base rests on livestock grazing, tourism, and government. These activities, along with education, transportation, and health services provide most employment.

Data on the public finances (sources and uses of public funds) of the Hualapai were not available.

San Juan Southern Paiute

The San Juan Southern Paiutes were formally recognized by the Federal government as a tribe in 1990, but were not assigned reservation lands. The lands they claim are in the region of the project but would not be crossed by any of the NTP alternative routes. At present the San Juan Southern Paiute reside mainly in Coconino County, Arizona, and in 1996, 250 members were documented by BIA as living in the area. Census data for 1990 are not available for the San Juan Southern Paiute, so it is not possible to provide detailed demographic statistics. However, since the San Juan Southern Paiute Tribe is located in Coconino County, it probably experiences economic conditions similar to those of the Navajo living in the area.

Navajo

The Navajo Reservation extends from northwestern New Mexico to north-central Arizona, spanning four counties including San Juan County in New Mexico, and Apache, Navajo, and Coconino counties in Arizona. In 1991, the Navajo Reservation covered approximately 2,329,600 acres in New Mexico and 14,775,068 acres in Arizona. The Navajo Reservation is subdivided into 110 local jurisdictions referred to as chapters. Although the socioeconomic characteristics of the Nation vary across the study area, basic trends are clear.

From 1970 to 1990, population trends for the reservation and trust lands indicated a substantial but slowing rate of increase, rising from 95,104 in 1970 to 140,984 in 1980, and to 155,276 by 1990. While the median age of Navajo residents is low (22.3 years), a decreasing birth rate and out-migration of young people searching for jobs and education are factors that have contributed to a lower rate of population growth.

In 1990, 27.9 percent of the Navajo Nation's labor force was unemployed. The mean annual household income was $10,433. Income from social security, public assistance, and retirement benefits contributed to the economy, with 58.8 percent of the households in 1990 receiving funds from at least one of these sources. The Navajo Nation's per capita income level in 1990 was $4,106, with 56.1 percent of the population living below the poverty level. Housing statistics indicate an average of 4.07 persons per household in 1990. Fifty percent of the houses on the reservation lacked complete plumbing and 77.5 percent lacked complete kitchen facilities and telephones. Wood and gas were the principal fuels in 81 percent of the homes.

The economic base of the Navajo Nation rests on coal mining, some manufacturing (e.g., artisan industry), tourism, and government. Livestock grazing, mining, retail trade, construction, health, and education provide most of the jobs on the reservation.

Data on the public finances (sources and uses of public funds) of the Navajo Nation were not available.

Navajo Chapter Services—The manuscript *Chapter Images* was reviewed to identify the locations of health and safety services in the project area that could be used by construction personnel. Due to the number and range of health and safety services offered by individual chapters, comprehensive tables of police, fire, and hospital services that serve each chapter within the Navajo Reservation were compiled. To provide an overview of the range of services available and the primary locations of police, hospital, and fire protection services within the Navajo Reservation, the data are summarized below for the Western Navajo, Eastern Navajo, Fort Defiance, Chinle, and Shiprock agencies.

Ten police service districts and substations serve the entire Navajo Reservation, covering 110 chapters. The Crownpoint district (serving 32 chapters), Shiprock (19), Tuba City (10), Window Rock (16), and Chinle (15) districts serve 84 percent (92) of the chapters in the Navajo Reservation. The remaining districts, Kayenta (8), Dilkon (5), Ganado (3), Piñon (1), and the Toyei Substation (1) serve the remaining 18 chapters. Table 3-5 summarizes the information. A total of 272 police officers were identified with the police service districts, distributed as follows among the Navajo agencies: Western Navajo—77; Eastern Navajo—67; Fort Defiance—41; Chinle—47; Shiprock—40.

TABLE 3-5
NUMBER OF CHAPTERS SERVED BY POLICE SERVICES
(by agency)

Police Service District	Western Navajo	Eastern Navajo	Fort Defiance	Chinle	Shiprock	Totals
Tuba City District	10					10
Kayenta District	7				1	8
Toyei Substation	1					1
Window Rock		1	15			16
Crownpoint		29	3			32
Ganado			3			3
Dilkon			5			5
Chinle			1	13	1	15
Shiprock			1		18	19
Piñon				1		1
Totals	18	30	28	14	20	110

Twenty-two hospitals serve the entire Navajo Reservation, collectively covering 186 chapters. On average, each hospital serves 8.5 chapters. The Steamboat Chapter in the Fort Defiance Agency is served by the greatest number of hospitals (a total of four), while 32 chapters are served by only one hospital facility. Table 3-6 presents a summary of the data. The Gallup Indian Health Center serves the largest number of chapters within the Navajo Nation (36 chapters), and is followed by the Shiprock Indian Health Center (serving 23 chapters). The Crownpoint Indian Health Facility and Chinle Indian Hospital each serve 20 chapters while the Fort Defiance Indian Health Center and the Tuba City Indian Medical Center serve 19 and 18 chapters, respectively. The San Juan Regional Medical Center and the Keams Canyon Indian Hospital serve 11 and 10 chapters, respectively. The Winslow Health Center serves six chapters, Sage Memorial Hospital and Rehoboth McKinley Christian Center each serve four, Monument Valley Health Facility serves three, Albuquerque and Flagstaff Indian Hospitals each serve two chapters, while Blackrock, Ganado, Kayenta, Laguna-Acoma, Page, Presbyterian, Socorro and Zuni medical facilities each serve one chapter.

Information on fire protection and prevention services for each chapter was obtained from the manuscript *Chapter Images*, but this data consisted of agency maps showing fire trucks within chapters that provide this service. It is uncertain whether these services are available to adjoining chapters, but given the isolation of many chapters from large cities, it is assumed that the chapters with fire services provide protection in adjoining chapters. The Fort Defiance Agency contains the most chapters with fire protection services (seven), followed by the Chinle Agency (five), the Western Navajo and Shiprock agencies (four each), and, finally, the Eastern Navajo Agency with four chapters served.

VISUAL RESOURCES

The visual resource inventory includes the evaluation of scenic quality, existing visual conditions, visual sensitivity, and agency management objectives. A six-mile-wide study corridor, three miles on each side of the reference centerline, was used to inventory visual resources as it represents an approximate threshold for moderate to high visual impacts. In special locations identified by cooperating agencies, impacts were studied beyond three miles.

The visual resource inventory is summarized in two major sections below. First, a project area overview describes applicable regulations and introduces each component of the visual resource inventory, and second, the results of the inventory are summarized by alternative route. Maps illustrating these descriptions include Figures 3-3 and 3-4 and Figures MV-10E through MV-13W.

OVERVIEW

Scenic Quality—The elements of scenic quality include the character and diversity of landform, vegetation, water, color, and cultural or man-made features. Landscapes with greater diversity of features are typically considered to have higher scenic quality.

TABLE 3-6
NUMBER OF CHAPTERS SERVED BY HOSPITAL SERVICES
(by agency)

Service District	Western Navajo	Eastern Navajo	Fort Defiance	Chinle	Shiprock	Totals
Albuquerque Indian Hospital		2				2
Blackrock		1				1
Chinle	1		4	14	1	20
Crownpoint		18	2			20
Flagstaff	2					2
Fort Defiance		2	17			19
Gallup		17	13	1	5	36
Ganado				1		1
Kayenta					1	1
Keams Canyon	1		7	2		10
Laguna-Acoma		1				1
Monument Valley	2			1		3
Page	1					1
Presbyterian Medical Service		1				1
Rehoboth McKinley Christian Hospital		3	1			4
Sage				4		4
San Juan		2			9	11
Shiprock		3			20	23
Socorro		1				1
Tuba City	16			2		18
Winslow	3		3			6
Zuni		1				1
Totals	26	52	47	25	36	186

The project area includes a diverse range of largely undeveloped vistas and open landscapes interspersed with small communities and rural towns. The landscapes are dominated by the distinctive features and landforms of the Colorado Plateau and Basin and Range physiographic provinces.

A majority of the project area in New Mexico and Arizona is located on the Colorado Plateau. Major distinguishing landforms of the Colorado Plateau are formed from horizontal strata including mesas, canyons, and landmarks such as Shiprock. Vegetation is generally sparse with densely forested areas limited primarily to the Chuska Mountains. Water features are isolated and limited to the San Juan and Colorado rivers, as well as other ephemeral creeks. The region is otherwise arid. The exposed strata in the landforms provide a wide range of colors such as those that occur in the Monument Valley Navajo Tribal Park, Painted Desert, Chuska Mountains, Black Mesa, and portions of the Grand Canyon.

The Basin and Range area in Nevada is distinguished by isolated, roughly parallel, north-south trending mountain ranges separated by closed (undrained) desert basins. There is limited diversity in the basin areas; however, the surrounding ranges provide visual interest and diversity in landforms, vegetation, and color.

For purposes of the visual resource studies, areas are assigned one of the following scenic quality classifications:

Class A—lands of outstanding or distinctive diversity or interest
Class B—lands of common or average diversity or interest
Class C—lands of minimal diversity or interest

Eight percent of the lands crossed by NTP alternatives are Class A lands. These are represented by unique landscapes including high relief mountains, escarpments, highly dissected canyons, monumental landforms, and riverways. Forty-six percent of the lands crossed by NTP alternatives are Class B lands. Class B scenic quality areas consist primarily of rolling vegetated hills and valleys, mesas, and buttes. The remaining 46 percent of lands crossed by NTP alternatives are Class C scenic quality areas. These are represented primarily by high desert plateaus and desert basin areas.

Landscape character types and scenic quality levels are shown in Figures MV-10E and MV-10W.

Existing Visual Conditions—Cultural or man-made features are dispersed throughout the lands along the alternative routes and include communities, rural residences, agricultural lands and ranches, mines, energy and communication facilities (e.g., transmission lines, pipelines, fiber optic cables), highways, and roads. Most of the land crossed by the alternatives exhibits visual conditions that have been locally modified primarily due to the presence of existing transmission lines paralleled by the alternative routes as shown in Figures 3-3 and 3-4.

Visual Sensitivity—Visual sensitivity reflects the degree of public concern for change in the scenic quality of the landscape from key viewing areas. Both the type of viewpoint and the distance from viewers are considered. Visual sensitivity levels (high, moderate, or low) reflect the type of viewpoint and viewer concern for change, volume of use, public and agency concerns, influence of adjacent land use, and viewing duration. Distance from the viewer is defined as foreground (0 to 0.5 mile), middleground (0.5

mile to 3 to 5 miles), background (beyond 3 to 5 miles), or seldom seen areas (beyond 15 miles). Viewers are primarily dispersed with larger concentrations in small scattered communities and at recreational sites throughout the project area. Key viewpoints within the project area include residences, communities, park and recreation areas, travel routes, and historic trails or sites. Numerous parks, national monuments, and recreational areas in the region are considered to be of national significance including the Grand Canyon, Monument Valley, Canyon de Chelly, and the Glen Canyon and Lake Mead NRAs. Many of the travel routes within the project area, including historic U.S. Route 66, serve as access to these destinations. Generally, views from these locations are considered to be of high sensitivity because of the level of viewer and agency concern and use volumes.

The landscape setting of the project area allows for views that are often vast, expansive, and unobstructed for several miles. Areas limited to foreground and middleground views are primarily associated with either mountainous terrain, river valleys, streams, or canyons.

Views from high sensitivity residential viewpoints are shown in Figures MV-11E and MV-11W. Views from sensitive parks, recreation areas, roads, and cultural sites are shown in Figures MV-12E and MV-12W.

Agency Management Objectives—There are no formal guidelines for managing visual resources on state, county, city, private, American Indian, or NPS lands within the project area. Visual resources on lands administered by BLM and Forest Service are managed through the Farmington, Phoenix, and Las Vegas districts (BLM), and the Coconino and Kaibab national forests.

Visual management objectives define the acceptable degree of visual change in the natural landscape on public lands. These objectives are classified differently by the Forest Service than by BLM. Forest Service classifications are called Visual Quality Objectives (VQOs), and BLM classifications are called Visual Resource Management Classes (VRM classes). The five VQO classifications are as follows: preservation, retention, partial retention, modification, and maximum modification.

Preservation areas are afforded the highest level of protection and maximum modification areas the lowest. There are four VRM classes (I, II, III, and IV). Class I areas are afforded the highest level of protection and Class IV areas the lowest.

Both the BLM and Forest Service derive visual management objectives by considering scenic quality (BLM) or variety class (Forest Service), visual sensitivity, and visibility from sensitive viewpoints. A majority of the BLM and Forest Service lands associated with alternative routes are managed to allow for modifications or development that may be evident (BLM Class III or Forest Service Partial Retention), or even dominant (BLM Class IV or Forest Service Modification) in the landscape (Figures MV-13E and MV-13W). Class II areas on BLM lands are located primarily in the vicinity of the Highland Range, Eldorado Mountains, Grand Wash Cliffs, and Music Mountains; and Forest Service retention areas are generally associated with U.S. Highway 180 and Red Horse Wash area. Both Class II and Retention areas are managed to allow for change that should not be evident in the landscape. No Class I or Preservation areas would be traversed by any of the alternative routes.

ALTERNATIVES

The results of the visual resources inventory are summarized below for each alternative route, substation, and the communication site. Discussions include scenic quality, existing visual conditions, visual sensitivity, and agency management objectives. Figures MV-10E through MV-13W illustrate visual resources within a six-mile-wide corridor.

Eastern Area Transmission Line Alternatives

Glen Canyon 1 (GC1)

New Mexico

Scenic Quality and Existing Visual Conditions—The majority of lands crossed by GC1 in New Mexico are Class C, consisting of dissected desert plains. Class B landscapes are associated with the eroded terraces of the San Juan River Valley (Link 460), and The Hogback area (Link 100). Class A areas are limited to the crossing of the San Juan River on Link 460. The existing visual conditions have been modified by the 230kV transmission line that GC1 parallels along its entire length.

Visual Sensitivity—High sensitivity viewpoints along GC1 are from dispersed rural residences in the San Juan River Valley and from U.S. Highway 64. Residential viewers are primarily concentrated along the river immediately north of the town of Shiprock. Views from these residences are open to partially screened, and range from foreground to middleground and background views along Link 460. Views from U.S. Highway 64 are limited and in the background from the river valley setting (Link 460). U.S. Highway 666 (moderate sensitivity) is crossed by GC1. Views from this highway are open in the foreground, middleground, and background areas (Link 460).

Agency Management Objectives—GC1 crosses lands within the Farmington District of the BLM, west of the Shiprock Substation on Link 100. This area has been designated as VRM Class IV. There would be no Forest Service lands crossed by GC1.

Arizona

Scenic Quality—The majority of lands crossed by GC1 are designated Class C and Class B landscapes. Class C areas include dissected, sandstone, and grassland plains characteristic of Links 461, 501, and 586. Class B landscapes are associated with the dissected plateau and buttes north of the Carrizo Mountains near Teec Nos Pos (Link 460); drainage crossings at Chinle, Walker, and Laguna Creeks (Link 461); the piñon-juniper covered hills on the Shonto Plateau (Link 580); outcroppings and the piñon-juniper grasslands on the Kaibito Plateau south of Page (Links 1389, 1393, and 1397); and the badlands and eroded terraces west of Tuba City and in the vicinity of The Gap and Cameron (Links 1384, 1397, 1383, and 1386). Class A areas occur along the Red Point Mesa cliffs (Link 501), the northern escarpment of Black Mesa (Links 504 and 561), across the red sandstone formations and canyonlands east of Kaibito

(Links 580 and 561), at the crossing of Choal Canyon (Links 1390, 586, and 587); and along the Echo Cliffs near The Gap (Link 1383).

Existing Visual Conditions—Existing 230kV, 345kV, and 500kV transmission lines are paralleled with the exception of Link 463 near Dennehotso, Links 501 and 502 southeast of Kayenta, Links 504 and 561 on the northern edge of Black Mesa, and Links 621 and 627 immediately south of the city of Page (3.0 miles). Along portions of Links 1389, 1383, 1384, and 1386, GC1 would be located within a corridor that may contain as many as two to four additional transmission lines (345kV or 500kV).

Visual Sensitivity—High sensitivity residential viewpoints are located within and on the fringe of several communities in proximity to GC1 including Red Mesa, Mexican Water, Tes Nez Iah, Dennehotso (Links 461 and 463), Kayenta (Link 502), Tsegi (Link 561), Shonto (Link 580), Page and Lechee (Links 621, 627, and 1389), The Gap (Link 1383), and Cameron (Link 1386). Other areas with dispersed rural residential views are concentrated along U.S. Highway 160 in the Four Corners area extending west to Black Mesa (Links 460, 461, 463, 501, 502, 504, and 561), northwest of White Mesa (Links 581, 586, and 587), on the Kaibito Plateau west of Copper Mine (Links 1389, 1393, and 1397), and north of Cameron (Link 1384). Most of these residences have open to partially screened foreground to middleground and background views in these areas.

High sensitivity travel routes include U.S. Highway 89 and 64 and Arizona State Routes 98, 564, and 64. U.S. Highway 89 provides primary access to major recreation destinations including Grand Canyon National Park and Glen Canyon NRA. GC1 parallels and crosses this highway, with views primarily ranging from middleground to background areas (Links 627, 1384, and 1389). Viewing conditions from this highway are often partially or fully screened based on local topography; however, there are open foreground views from the highway crossing at The Gap (Link 1383). GC1 parallels and crosses State Route 98 in an open foreground setting east of Page and are open to screened in views from this road between Kaibito and Shonto (Links 580, 581, 587, and 620). Views from State Route 564 are partially to fully screened due to foreground vegetation and terrain (Links 561 and 580), and State Route 64 have foreground to background views in an open setting (Link 1386). Views from the proposed Great Western Trail, a high sensitivity historic travel route, are open in a panoramic setting (Links 1386, 1389, and 1397) and views from Cameron Bridge (National Register site), located in Cameron, are open (Link 1386).

Moderate sensitivity travel routes that are crossed by GC1 include U.S. Highway 160, and Tribal Route 59. U.S. 160, a proposed state scenic route, provides primary east-west access to Navajo lands from the Four Corners area and is paralleled and crossed six times by GC1. Foreground views from this highway are primarily open from Four Corners to Kayenta (Links 460, 461, 463, and 502), and become more restricted in the Long House Valley area (Link 561). Views from Tribal Route 59 are partially screened by local terrain. Other important views include those from a rest area located on U.S. 160 near Mexican Water that are screened by foreground terrain (Link 461). Views from U.S. Highway 163, a proposed state scenic route that provides primary access to Monument Valley, are open and panoramic in a flat, open valley; however, development in the community of Kayenta partially screens some views from this highway (Links 502 and 504). Foreground and middleground views from U.S. Highway 191 near Mexican Water (Link 461) are open to partially screened due to the terrain.

Agency Management Objectives—GC1 does not cross any lands administered by BLM or Forest Service.

Kaibito 1 (K1)

New Mexico

The New Mexico portion of K1 is the same as GC1.

Arizona

The Arizona portion of K1 is the same as GC1 except for the use of Links 1390 and 1391 across the Kaibito Plateau (which replace Links 587, 620, 621, 627, and 1389 on GC1).

Scenic Quality and Existing Visual Conditions—This portion of K1 is characterized primarily by Class C scenery consisting of plateau grasslands and high desert plateau. A small portion of Class B scenery also is crossed, including piñon-juniper covered grasslands (Link 1391) and Circular White Ridge (Links 1390 and 1391). Existing visual conditions in this area are primarily natural, with dispersed rural residences. Link 1390 crosses the Black Mesa and Lake Powell Railroad. In this area, this segment of K1 would be a new transmission line corridor.

Visual Sensitivity—High sensitivity viewpoints consist of limited, dispersed rural residences that have predominantly open views ranging from foreground to background. K1 crosses State Highway 98 in a setting that provides partial screening in the middleground and background areas in the vicinity of Horse Thief Mesa (Link 1390). Also, there are very limited background views from the proposed Great Western Trail (Link 1391) where this alternative intersects Link 1393 in an existing transmission line corridor.

Agency Management Objectives—No lands administered by BLM or Forest Service are crossed by K1 in this area.

Central 1 (C1)

New Mexico

Scenic Quality—The majority of lands crossed by C1 are Class C, consisting of dissected desert plains. Class B landscapes crossed include the San Juan River Valley west of Fruitland (Link 240), Chaco Wash and The Hogback ridge (Links 360 and 640), and Rock Ridge (Link 700). Other prominent Class B features within the immediate vicinity include Table Mesa and Cathedral Cliff. Class A areas are limited to the crossing of the San Juan River (Link 240), and portions of the eastern slope of the Chuska Mountains immediately south of the reference centerline (Link 700).

Existing Visual Conditions—Existing transmission lines or pipelines are paralleled over its entire length except 10.4 miles on Links 360 and 640 through The Hogback area. Conditions have been substantially affected in the vicinity of Links 180, 240, and 300, where C1 parallels a combination of 115kV and 345kV transmission lines. In addition, Link 700 parallels an existing 500kV transmission line.

Visual Sensitivity—High sensitivity viewpoints include rural residences, U.S. Highway 64, and selective cultural sites. Residential viewers are primarily concentrated along the San Juan River in the Fruitland and Waterflow areas (Link 240) with additional dispersed residences adjacent to U.S. Highway 666 south of Shiprock, and within the foothills of the Chuska Mountains north of Sanostee (Link 700). Views from these residences are typically open to partially screened and range from foreground to background.

U.S. Highways 64 and 666 are crossed by C1 in an existing transmission line corridor. Views from U.S. 64 are open to partially screened by vegetation and terrain (Link 240), and views from U.S. 666 (moderate sensitivity) are in an open and panoramic setting (Link 700). Cultural sites considered to be highly sensitive with potential background views include the Pictured Cliffs area (Links 180 and 240) and Mitten Rock (Link 700).

Agency Management Objectives—VRM Class II and IV areas are crossed by C1 along the San Juan River (Links 180 and 240). No lands administered by Forest Service are crossed by C1.

Arizona

Scenic Quality—Class C landscapes are predominant along C1, including dissected upland plains north and west of Lukachukai (Link 700); on the southern edge of Black Mesa (Links 701 and 780); and across the grasslands of First, Second, and Third mesas and the Moenkopi Plateau (Link 780). Class B areas are primarily associated with major drainages and areas of diverse landform or color including Tsedatoh Canyon, Agua Sal Creek, Yellowstone Canyon, and Chinle Wash (Link 700); the Cottonwood Wash area (Link 701); and the Chaaghaztial area, Polacca Wash, Burnt Corn Valley, Oraibi Wash, Dinnebito Wash, Howell Mesa, and portions of the lower Moenkopi Plateau and the Painted Desert (Link 700). Class A areas are located at the crossing of the Chuska Mountains northeast of Lukachukai (Link 700); and Lohali Mesa, Toadindaaska Mesa, Coal Mine Mesa and the Adeii Eechii Cliffs (Link 780).

Existing Visual Conditions—C1 parallels a 500kV transmission line that has modified existing visual conditions along its entire length. These modifications are particularly evident in localized areas where tree clearing for right-of-way and access roads has accentuated the change to the natural character of the landscape, such as the Chuska Mountains (Link 700).

Visual Sensitivity—Open views from residences on the fringe of rural communities in the foreground and middleground are found near Lukachukai (Link 700); Dinnebito, Hard Rocks, and Cameron (Link 780). Dispersed residences with open views are scattered along C1, with higher concentrations in the areas north of Chinle along U.S. Highway 191 (Link 700), and in the Cottonwood and Piñon areas (Link 780). C1 crosses high sensitivity roads including Tribal Route 12 west of Lukachukai (Link 700) and U.S. Highway 89 west of Cameron (Link 780), both with open foreground and middleground views. Moderate sensitivity travel routes crossed by C1 include U.S. Highway 191 north of Chinle with

panoramic views (Link 700) and State Route 264 near Coal Mine Mesa with open views (Link 780). C1 also crosses the proposed Great Western Trail along the Little Colorado River with open and extended views. Cultural sites considered to be high sensitivity viewpoints include Taawa Tribal Park with partially screened middleground views, and Cameron Bridge with open background views (Link 780).

Agency Management Objectives—C1 does not cross any lands administered by BLM or Forest Service.

Central 2 (C2)

New Mexico

The New Mexico portion of C2 is the same as GC1 and K1.

Arizona

The Arizona portion of C2 varies from C1 by passing to the north and west of the Chuska Mountains along Link 460 near Teec Nos Pos and Link 462 in the Chinle Valley and across Carson Mesa. The portion of C2 from the Lohali Mesa area west to the Moenkopi Substation along Link 780 is the same as C1.

Scenic Quality—The western portion of Link 460 in Arizona and Link 462 primarily cross a mixture of Class B and Class C scenery. Class C areas are located in the dissected plains near Tsitah Wash along U.S. Highway 160 (Links 460 and 462), and in the Sandstone Plains south of Sweetwater and the grasslands associated with the Carson Mesa area (Link 462). Class B areas are crossed on the buttes north of the Carrizo Mountains (Link 460); and on the dissected plateau between Toh Atin and Cheznindeza Mesas, the Dibe Chaa Valley, and Black Mountain Wash (Link 462). No Class A areas are crossed by C2 on Links 461 and 462 in Arizona; however, distinctive features within the general vicinity include Walker Butte, Dancing Rocks, and Lohali Mesa.

Existing Visual Conditions—This portion of C2 includes the introduction of a new transmission line corridor on Link 462 across Carson Mesa and through the Chinle Valley (65.7 miles). The existing visual conditions in this area include only minor modifications associated with small communities (e.g., Sweetwater, Emmanuel Mission, and Rock Point), or scattered and dispersed rural residences.

Visual Sensitivity—The majority of residences with views to C2 are located near the communities of Teec Nos Pos (Link 460); and Sweetwater, Emmanuel Mission, and Rock Point (Link 462). Other dispersed residences are scattered throughout the Chinle Valley in the vicinity of Many Farms and Rough Rock and along the eastern slopes of Black Mesa. Views from these residential areas vary from foreground to background zones, primarily in open settings.

Three moderate sensitivity travel routes are crossed in this area by C2, including U.S. 160 north and west of Teec Nos Pos (Link 460), U.S. Highway 191 near Rock Point, and Tribal Roue 59 west of Many

Farms (Link 462). All of these roads have open to partially screened views extending from foreground to background.

Agency Management Objectives—No lands administered by BLM or Forest Service are crossed along this portion of C2.

Substation Alternatives

Shiprock Substation—The existing substation is located on an open plateau, which is generally characterized by Class B Scenery, with substantial modifications including existing transmission lines. Background views are screened from U.S. Highway 64, a high sensitivity road near Waterflow. BLM-administered lands in the vicinity are designated as VRM Class IV.

Honey Draw Substation Site—This is an undeveloped site in an area of Class B scenery; however, the site is adjacent to an existing 345kV transmission line, which has modified the setting. Background views from Page would be predominantly screened by terrain, and residences on the western edge of Lechee would have open to partially screened middleground views to the site. Views from two travel routes including U.S. Highway 89 (high sensitivity) and State Route 98 (moderate sensitivity) are screened by terrain.

Red Mesa Substation Site—This site is adjacent to an existing 345kV transmission line and characterized by Class B scenery consisting of sparsely scattered piñon-juniper grasslands. Residences in the vicinity of Circular White Ridge have partially screened background views of the site.

Copper Mine Substation Site—This site is situated between two existing 345kV transmission lines and is characterized by Class B scenery consisting of grasslands with a moderate to dense cover of piñon-juniper and scattered rock outcrops. Dispersed residences in the area have partially to fully screened middleground views to the site.

Moenkopi Substation—Located adjacent to the existing Moenkopi Substation on an eroded terrace above the Little Colorado River, the area is generally characterized as Class B scenery with substantial modifications including existing transmission lines. Residences and high sensitivity travel routes, including U.S. Highway 89 and Arizona State Route 64, have open to partially screened middleground and background views of the substation site area.

Western Area Transmission Line Alternatives - Moenkopi to Marketplace

Northern 1 - West (N1W)

Arizona

Scenic Quality—The majority of lands crossed by N1W are a combination of Class C and Class B scenery. Class C areas are predominant on the rolling grasslands west of Cameron (Link 1400); on the

plateau grasslands of the Coconino Plateau (Link 1660); in the basin grasslands of the Aubrey Valley (Link 1740, 1741, and portions of 1790) and the Hualapai Valley (Link 1790); and in the Detrital Valley (Link 2060). Class B landscapes are found in the Tappan Wash Canyon area and piñon-juniper woodlands on the Kaibab National Forest (Links 1400 and 1401); at Red Horse Wash, Cataract Canyon, Farm Dam Draw, and the eastern slopes of the Aubrey Cliffs (Link 1660); at the crossing of Blue Mountain, the foothills and canyon washes of the Peach Springs area, and the Music Mountains on Hualapai Indian Reservation (Link 1790); and in the White Hills and the Black Mountains (Link 2060). Areas of Class A scenery occur on the Coconino Rim (Link 1400); along the western side of the Aubrey Cliffs (Link 1660); in the upper reaches of Peach Springs and Milkweed canyons, and at the crossing of the western escarpment of the Grand Wash Cliffs (Link 1790); and at the eastern edge of the Colorado River crossing (Link 2060).

Existing Visual Conditions—N1W parallels a 500kV transmission line that has modified existing visual conditions along its entire length. These modifications are particularly evident in localized areas where the clearing of piñon-juniper for right-of-way and access roads has accentuated the changes to the natural character of the landscape. These modifications are most noticeable on portions of the Kaibab National Forest (Links 1400, 1401, and 1660), and in the Music Mountains and north of Peach Springs on Hualapai Indian lands (Link 1790).

Visual Sensitivity—Residential viewpoints are extremely limited and primarily located in the vicinity of Cameron (Links 1400 and 1401); in the Aubrey Valley (Links 1740 and 1741); in the vicinity of Peach Springs (Link 1790); and north of Dolan Springs (Link 2060). Views from most of these locations vary from middleground to background in settings that are open or partially screened due to local terrain and vegetation.

Several high sensitivity travel routes have views to this area. This alternative crosses U.S. Highway 180 and the Grand Canyon Railroad (Link 1660), Tribal Route 18 (Links 1740, 1741, and 1790), Buck and Doe Road, and the Diamond Creek Road (Link 1790), all of which serve as access routes to the Grand Canyon. Foreground views from U.S. 180, the Grand Canyon Railroad, and Diamond Creek Road are in open settings while views from Tribal Route 18 and Buck and Doe Road vary from open to partially and fully screened by terrain and vegetation. Historic Route 66 has views ranging from middleground to background areas in settings that are open to partially screened (Links 1740, 1741, and 1790). U.S. Highway 93 and the Dolan Springs Road, which serve as to access Lake Mead, also are crossed in an open setting.

High sensitivity recreational viewpoints include the Arizona Trail and Moqui Stage Station on the Kaibab National Forest. Views from these locations are open to partially screened by vegetation (Links 1401 and 1660).

The proposed Music Mountains Crest Trail is a moderate sensitivity recreation viewpoint located along the Grand Wash cliffs (Link 1790). Views from this trail are primarily open to partially screened in the foreground and middleground, based on terrain and vegetation.

Agency Management Objectives—VRM Class II areas are located in the Music Mountains and Grand Wash Cliffs area (Link 1790) and Class IV areas are crossed in the Aubrey Valley (Links 1660, 1740,

and 1741) and north and east of Dolan Springs (Links 1790 and 2060). Portions of the Kaibab National Forest crossed by N1W are predominantly designated as Partial Retention in the Red Horse Wash and Tappan Wash Canyon areas (Links 1400, 1401, and 1660) or Modification in the Tappan Wash (Link 1400). A small area of Retention is crossed in the vicinity of Russell Wash (Link 1401). Link 2060 crosses Lake Mead NRA within a designated utility corridor.

Nevada

Scenic Quality—N1W crosses Class C areas in the desert basin scrub of the Eldorado Valley (Links 2200 and 2180) and Class B landscapes on the Bajada east of the Eldorado Mountains (Link 2060). Class A areas crossed by N1W include the Colorado River, Eldorado Mountains (Link 2060), and northern slopes of the Highland Range (Link 2200).

Existing Visual Conditions—The existing visual conditions along N1W are modified for its entire length. Existing high-voltage transmission lines, ranging from 230kV to 500kV, are paralleled throughout the length of this route. These conditions have been substantially modified in the vicinity of Links 2200 and 2180 in the Eldorado Valley, where N1W parallels a combination of as many as three 230kV and three 500kV transmission lines as it approaches the Marketplace Substation.

Visual Sensitivity—Residential viewpoints are extremely limited and dispersed within the Eldorado Mountains and Eldorado Valley where middleground and background views of N1W would be fully or partially screened by terrain. N1W crosses U.S. Highway 95 (a moderate sensitivity road), and a high sensitivity travel route leading into the Lake Mead NRA. Views from these roads are open to partially screened in the foreground to middleground areas (Link 2060).

Management Objectives—Class II areas are crossed in the Eldorado Mountains (Link 2060). Class III areas are crossed throughout the Eldorado Valley (Links 2060, 2200, and 2180). Portions of Link 2060 also cross Lake Mead NRA within a designated utility corridor.

Northern 2 (N2)

Arizona

The Arizona portion of N2 is the same as N1W with the exception of Links 1742, 1800, 1980, and 2020, which are located to the south of the Hualapai Indian Reservation (and replace Link 1790 on N1W).

Scenic Quality—This portion of N2 is characterized by Class C scenery in the grasslands of the Aubrey Valley (Link 1742), Truxton Plains (Link 1980), and Hualapai Valley (Link 2020). Areas of Class B scenery are associated with Blue Mountain and Nelson Canyon (Link 1742), Blue Canyon (Links 1800 and 1980), and the southern foothills of the Music Mountains (Link 1980). Class A areas are crossed on Link 1980 at the Grand Wash Cliffs and Music Mountains.

Existing Visual Conditions—This portion of N2 includes the introduction of a new transmission line corridor on Links 1742, 1800, and 1980 in the Aubrey Valley and Truxton Plain (41.5 miles). The existing visual conditions in this area have been slightly modified by changes associated with the small communities of Truxton and Nelson, the Atchison Topeka and Santa Fe Railroad, and Nelson mine. Link 2020 parallels an existing 345kV and 500kV transmission line on the eastern edge of the Hualapai Valley.

Visual Sensitivity—Residential viewpoints in this area are primarily associated with the small communities of Nelson (Link 1742) and Truxton (Link 1980). Views from these towns, or residences in their outlying areas, are open to partially screened and primarily in middleground and background settings. Other dispersed residences north of Antares also are open to partially screened background views. High sensitivity travel routes include State Historic Route 66, which is crossed twice by N2, including views that range from foreground to background in open and partially screened settings (Links 1742 and 1980). In addition, the Beale Wagon Road, a historic travel route, and the proposed Music Mountain Trail are crossed south and west of Truxton (Link 1980) in an area with open to partially screened views.

Agency Management Objectives—This portion of N2 is south of the Hualapai Reservation and crosses portions of the BLM Kingman Resource Area. Areas administered by the BLM have been designated as VRM Class II in the Music Mountains and Grand Wash Cliffs (Link 1980); and VRM Class IV in the Aubrey Valley (Link 1742); Blue Canyon Area (Links 1980, 1800); Truxton Plains (Link 1980); and the Hualapai Valley (Link 2020).

Nevada

The Nevada portion of N2 is the same as N1W.

Southern 2 (S2)

Arizona

In Arizona, S2 varies from N2 beginning at the Moenkopi Substation and continuing west through Link 2006. At this point, S2 is then the same as N2 proceeding north and west along Links 2020 and 2060 to the crossing of the Colorado River and the Nevada border.

Scenic Quality—Class B scenery is predominant and located on the western edge of the Painted Desert and along Lava Wash (Link 1420); in the Cinder Cones juniper woodlands north and west of Mesa Butte (Links 1421, 1480, and 1520); the piñon-juniper woodlands and grasslands near Spring Valley Wash and Howard Mesa (Link 1640); at Cataract Canyon and the foothills near Paradise Ridge (Link 1680); Eight Mile Wash, Pineveta Creek, the Juniper Mountains, and east of Seligman (Link 1720); the crossing of the Seventyfour Plains (Link 1960); and the crossing of the Cottonwood Mountains and eastern slopes of the Peacock Mountains near Hackberry (Links 2000, 2002, and 2006). Class C areas primarily consist of grasslands found along portions of Links 1420, 1680, 1720, 2000, and 2006. This portion of S2 does not cross Class A scenery.

Existing Visual Conditions—Conditions along S2 vary substantially from N2, including areas of new corridor on Links 1720 and 2002 (24.8 miles); areas where pipeline and fiber optic cables are paralleled along Links 1680, 1720, and 1960 (89.4 miles); and an existing transmission line corridor on all or portions of Links 1420, 1421, 1480, 1520, 1640, 1680, 2000, and 2006. Areas of greatest existing modification are associated with existing transmission line corridors, while pipeline and fiber optic corridors are most apparent in areas where tree clearing has been required for rights-of-way.

Visual Sensitivity—Residences are sparse and primarily concentrated in the outlying areas of small communities in the vicinity of S2. In general, these residences have open to partially screened views in areas west of the town of Gray Mountain (Links 1420 and 1421), north of Red Lake (Link 1640), near Seligman (Link 1720), and in the vicinity of Hackberry (Links 2002 and 2006).

Several high sensitivity travel routes and recreation areas also have views of S2. Historic Route 66 is crossed twice—east of Seligman (Link 1720) and in the vicinity of Hackberry (Link 2006) in open to partially screened settings. The Grand Canyon Railroad and Arizona State Route 64 are crossed north of Red Lake in open to partially screened settings (Link 1680). U.S. Highway 180 also is crossed in a partially screened area east of Valle (Link 1640).

S2 crosses the Arizona Trail in an open setting (Link 1480), and crosses the Beale Wagon Road in three locations with views ranging from open (Links 1680 and 1720) to partially screened (Link 2006).

Moderate sensitivity travel routes include Interstate 40, which S2 crosses twice in open settings with extended views (Link 1720).

Agency Management Objectives—BLM-administered lands crossed by S2 have been designated as VRM Class IV. Those areas crossed on the Kaibab National Forest are generally characterized as Partial Retention, interspersed with Modification (Links 1640, 1680, and 1720), and Retention areas associated with U.S. Highway 180.

Nevada

The Nevada portion of S2 is the same as N1W and N2.

Western Area Transmission Line Alternatives - Moenkopi to Mead

Northern 3 (N3), Northern 4 (N4), Southern 4 (S4)

Alternatives N3, N4, and S4 are identical to alternatives N1W, N2, and S2, respectively, with the exception of Links 2040 and 2080, which connect into the Mead Substation rather than the Marketplace Substation (replacing Links 2060, 2200, and 2180). The following description focuses on Links 2040 and 2080.

Arizona

Scenic Quality—Link 2040 is characterized by a mixture of A, B, and C Class Scenery in Arizona. Class C scenery is characteristic of the basin grassland areas within the Detrital Valley and areas of Class B Scenery are associated with the crossing of the White Hills and Black Mountains. Link 2060 crosses the Colorado River in a distinctive mountainous and canyon setting designated as Class A Scenery.

Existing Visual Conditions —Conditions along Link 2040 have been modified by the 345kV and 500kV transmission lines that are paralleled. Modifications to the setting are particularly evident in the Black Mountain area due to the recent upgrade of existing roads and construction of new access roads for the 500kV line in areas of steep terrain.

Visual Sensitivity—Sensitive viewpoints consist primarily of travel routes and recreation sites, and a smaller number of residences with foreground-to-background views of this alternative. Four high sensitivity roads with open views are crossed by Link 2040 including U.S. Highway 93 and three local travel routes accessing Lake Mead NRA. Recreation viewpoints in Arizona are concentrated along the Colorado River, including Willow Beach Landing and Willow Beach Overlook, where views are partially or fully screened because of intervening terrain.

Agency Management Objectives—Link 2040 in Arizona is located on lands administered by the BLM Kingman Resource Area and designated as VRM Class IV. Portions of Link 2040 also are within a designated utility corridor. No lands administered by Forest Service are crossed by Link 2040.

Nevada

Scenic Quality—In Nevada, Link 2040 is characterized primarily by Class A Scenery associated with the crossing of the Colorado River Canyon and Eldorado Mountains immediately west of the river. Small portions of Link 2040 and Link 2080 are located in areas of Class C Scenery in the Eldorado Valley near the Mead Substation.

Existing Visual Conditions—Conditions along Links 2040 and 2080 in Nevada have been substantially modified by the presence of numerous transmission lines and electrical facilities near the Mead Substation in the Eldorado Valley. Links 2040 and 2080 parallel 345kV and 500kV transmission lines in this area. Modifications to the setting also are particularly evident in the Eldorado Mountains because of the recent upgrade of existing roads and construction of new access roads for the 500kV line in areas of steep terrain.

Visual Sensitivity—In Nevada, residences south of Boulder City have middleground-to-background views into the Mead Substation area.

Agency Management Objectives—Link 2040 crosses areas under the jurisdiction of the NPS at Lake Mead NRA that are within a designated utility corridor. Lands administered by the BLM Stateline Resource Area along Links 2040 and 2080 have been characterized as an interim VRM Class III.

Substation Alternatives

Red Lake Substation Site—The site is located north of Red Lake and adjacent to State Route 64 near Howard Mesa. The site is located in an area designated as Class B and C scenery. Existing visual conditions in this area have been modified based on the presence of two existing 500kV transmission lines. Foreground and middleground views of the site from Arizona Route 64 (a proposed state scenic route), Grand Canyon Railroad, and Beale Wagon Road are generally screened by foreground vegetation. Residential middleground views also are partially screened by vegetation.

Mead and Marketplace Substations—This general area has been characterized as Class C Scenery, with extensive modifications because of the existing substation and numerous transmission lines in the vicinity. There are no sensitive viewpoints located near this substation, and BLM has characterized this general area as an interim VRM Class III.

Microwave Communication Facility

The general area is characterized as Class B Scenery; however, the proposed facility, a parabolic dish, would be attached to an existing structure. Sensitive viewers include recreational users and viewers on Interstate 40. Views to the site area primarily range from middleground to background. The Forest Service has characterized the general area as a Partial Retention VQO; however, the proposed parabolic dish would be located in an area designated by the Forest Service as a communication site.

CULTURAL RESOURCES

Cultural resources are used to encompass physical manifestations of the region's heritage that are resources worthy of inventory and evaluation for listing on the National Register, counterpart state registers, or are deemed potentially significant by traditional cultural groups. Anthropologists define "culture" as those learned behaviors that human societies pass on from generation to generation. In this sense, culture is a broad concept encompassing our customs and traditions, including languages, social structures, religions, economies, and styles of shelter and clothing. The National Historic Preservation Act (NHPA) provides a regulatory definition of "historic properties" as including prehistoric and historic sites, buildings, structures, districts, and objects included in or eligible for inclusion in the National Register of Historic Places, as well as artifacts, records, and remains related to such properties. Traditional cultural places rooted in a community's history also may be eligible for inclusion in the National Register because of their association with cultural practices or beliefs that are important in maintaining the cultural identity of that community (*National Register Bulletin* 38).

The results of the inventory are summarized in an overview which describes a cultural history of the area and introduces each component addressed: (1) archaeological and historical sites, (2) special status cultural resources, and (3) traditional cultural places.

OVERVIEW

Cultural History—The project area, as much of North America, has been occupied by human societies, at least intermittently, since about 10,000 BC and perhaps even earlier. From about 10,000 BC to 7,000 or 5,000 BC, highly mobile Paleo-Indian groups lived by hunting game and gathering natural plant foods. Their hunting strategy focused on large Pleistocene game animals, many of which became extinct as the last Ice Age waned. In general, Paleo-Indian sites are rare throughout the project area.

During approximately the next five to six millennia of the Archaic era, local groups hunted and gathered a diversity of animal and plant foods. During the later part of the Archaic period, some groups in some parts of the project area began growing domesticated crops, especially maize. However, this new subsistence strategy initially had only minor impacts on settlement strategies, which continued to emphasize seasonal movements of relatively small groups to hunt game and gather natural foods. The local Archaic cultures are identified by a number of spatial and temporal phase labels reflecting increasing cultural diversity within the project area. Archaeological sites representing the Archaic era are more common than Paleo-Indian sites, but still constitute a small percentage of the regional archaeological record.

More intensive use of crops, evidence of more substantial residential architecture in the form of pit houses followed by masonry pueblos, and the making and using of ceramic jars and bowls mark the advent of the Formative era, which dates from about AD 100 or 500 to about AD 1300 or 1400 in various parts of the project area. Although Formative groups continued to hunt game and gather natural plant foods, they increasingly relied on farming and adopted a more sedentary life. The population of the region increased substantially during the Formative era, and sites reflecting this time period dominate the archaeological record of the project area.

The local Formative cultures within the project area are identified by several labels including Anasazi (also called Hisatsinom, or Basketmaker/Pueblo), Sinagua, Virgin Anasazi, and Patayan. More specific spatial and temporal phases have been defined, reflecting substantial differentiation among local populations as evidenced by variation in types of ceramics, architecture, and other cultural traits. At the beginning of the sequence, settlements tended to be small clusters of a few pit houses. Subsequently, larger villages were built, and social and economic systems became quite complex. These are especially evidenced in the eastern part of the project area by the Chaco Canyon people, who constructed scores of large, distinctive pueblos across their territory, built miles of roads to connect many of these places, and traded for exotic goods as far as Mexico.

By about AD 1350 to 1450, the sedentary farming societies no longer existed in most of the region. When the first Spanish explorers arrived in the area during the sixteenth century, they documented sedentary puebloan peoples residing primarily in the Rio Grande Valley of New Mexico, with a few scattered clusters to the west, including approximately half a dozen pueblos each at Zuni and Hopi. Farming societies that spoke Yuman languages lived along the lower Colorado River when the first Europeans arrived in that region.

Athabaskan speakers, who migrated from their original homelands in Canada, arrived in the region about the same time as the Spanish, or perhaps a few centuries earlier, and eventually differentiated into the

Navajo and various Apache groups. The Navajos and Apaches, along with other groups who relied more on hunting and gathering and less on farming, including the Southern Utes, Southern Paiutes, Hualapais, Havasupais, and Yavapais, occupied the regions beyond the more settled groups.

The Spanish arrived in the sixteenth century, but never occupied the project area intensively. However, their arrival greatly affected aboriginal economies through introduction of domesticated animals, new crops, and new crafts, and decimated native populations through the introduction of European diseases. The era of Mexican rule during the second quarter of the 1800s resulted in little change, but after the area became part of the United States during the mid 1800s, the pace of white settlement quickened dramatically. Aboriginal peoples who militarily resisted the newcomers soon were defeated and forced to accept treaties relegating themselves to reservations. Other more cooperative groups such as the Hopi were not forced to sign treaties, but their access to parts of their traditional territories was reduced by imposition of reservations.

Ranching, logging, and mining were major themes of the historic aboriginal and white occupation of the last century and a half. Construction of railroads in the 1880s stimulated integration with national and global economies and increased the pace of settlement. Despite the dominating influence of the U.S. government, many aboriginal cultures remain in the region today. These groups vigorously maintain aspects of their traditional heritage while continuing to adapt their lifeways to the dominant society.

Archaeological and Historical Sites—Archaeological and historical sites are abundant throughout the project area, but little of the project area has been intensively inventoried. Many of the alternative routes are adjacent to previously constructed transmission lines or other utilities such as pipelines. More than a dozen cultural resource surveys were conducted in conjunction with the planning of some of these facilities, but most were undertaken some 10 to 40 years ago and do not reflect current field survey and documentation standards. The two surveys of existing linear facilities that do meet current standards for survey parallel approximately 12 percent of the length of all the NTP alternative routes.

Agency records were reviewed to compile information about prior inventories and previously recorded archaeological and historical sites. Numerous prior surveys were identified as encompassing portions of 0.5-mile-wide study corridors along all of the alternative routes. Many of these prior surveys are not well documented, but they constitute approximately a 3 to 4 percent sample of the study corridors in New Mexico and Arizona, and about 16 percent of the corridors in Nevada. About 280 previously recorded archaeological and historical sites were identified within the 0.5-mile-wide corridors along all the alternative routes (Figures MV-14E and MV-14W). About 15 percent of these are in New Mexico, 81 percent in Arizona, and 4 percent in Nevada.

Criteria were developed for characterizing the recorded archaeological and historical sites as having low, moderate, or high sensitivities. *Low sensitivity* was assigned to sites consisting of artifact scatters with little potential for buried archaeological deposits and features. *Moderate sensitivity* was assigned to archaeological sites representing small to moderate prehistoric or historic habitations, temporary camps, and work stations. *High sensitivity* was assigned to major prehistoric and historic locales, including large habitation sites and sites where burials have been specifically documented.

Characterization of archaeological and historical sensitivity for the alternative routes is based on the compiled information and the results of selected prior surveys within each of the physiographic/ environmental zones crossed by each route. Areas where the available data suggest an average of one or more sites expected per linear mile of right-of-way, with many of these sites being large and complex, are characterized as high sensitivity zones. Sensitivity is classified as moderate where an average of one site can be expected within approximately every two to four linear miles of right-of-way, with some sites being large and complex. Regions where an average of one archaeological or historical site can be expected for about every five or more linear miles of right-of-way, and relatively few are expected to be complex, are characterized as low sensitivity zones.

Projected sensitivities are typically high in the east and decrease to the west. About 80 percent of the total miles of alternative corridors in the New Mexico section of the project area are characterized as being highly sensitive, with the others classed as low sensitivity zones. Approximately 10 percent of the alternative corridors in Arizona are classified as highly sensitive, about 50 percent as moderately sensitive, and the remaining 40 percent as low sensitivity zones. All of the alternative routes in Nevada are characterized as having low sensitivity.

Special Status Cultural Resources—These were defined to focus consideration on resources having particular designations reflecting agency priorities for in-place preservation or public interpretation. Three levels of high sensitivity were defined for special status resources. *High-moderate sensitivity* resources include properties listed on state registers, resources designated by the BLM as ACECs, or other resources provided special protection or public interpretation by other agencies such as the Forest Service. *High sensitivity* resources include properties listed on the National Register of Historic Places, candidates for designation as Chaco protection sites, and tribal cultural parks. *Very high sensitivity* resources include national monuments and national historic sites managed by the NPS, designated national historic landmarks, national historic roads, and major archaeological sites that have been designated as Chaco protection sites in association with the Chaco Culture National Historic Park.

The values of special status resources could be affected by visual intrusions, and the analysis was coordinated with the visual resource studies. Accordingly, special status resources were evaluated within a six-mile-wide study corridor centered along each alternative transmission line route.

A total of 10 special status cultural resources were identified within the six-mile-wide corridors that were inventoried. Two of these are in New Mexico, seven in Arizona, and one is on the border between Arizona and Nevada.

Traditional Cultural Places—Many American Indian communities reside within or in the vicinity of the project area and heritage resources related to their traditional lifeways are common. Consideration of traditional cultural places as an aspect of environmental impact analysis and historic preservation studies is a new emphasis of regulatory review. Because such considerations are a recent development, no extensive repositories of inventory information have been developed, and often information about traditional places, particularly those related to ritual and ceremonial uses, is considered confidential and therefore is not readily available.

In conjunction with preparation of this DEIS, three separate studies were undertaken to address traditional cultural places valued by the three tribes that were formally designated as cooperating agencies for the DEIS studies, and whose reservation lands might be directly affected by the project. These tribes include the Navajo, Hopi, and Hualapai. Tribal members of each group participated in these studies, which were tailored to address the specific concerns of each tribe.

The Navajo study focused on places named in major ceremonial stories. The Hopi study primarily relied on land use information that had been previously compiled for land claims cases. The Hualapai study emphasized places named in traditional histories of the various social bands of the Hualapai, particularly resource collection, habitation, and burial areas. Although data collection strategies were tailored for each study, all focused on six-mile-wide study corridors centered on each link of the alternative routes.

The three studies identified many places having high sensitivity for traditional Navajos, Hopis, and Hualapais. In general, sensitivities for each group are high in many places within the core of their own traditional territory and decline with distance. The high sensitivity areas of the Navajos and Hopis overlap considerably in the eastern part of the project area and decrease to the west, where sensitivities become high for the Hualapais. Inventoried information within the six-mile-wide corridors served as the basis to establish sensitivity levels that are shown within a one-mile-wide corridor for all of the alternative routes.

Because traditional resources are so broadly distributed, no route can avoid crossing zones characterized as having high traditional cultural sensitivity. More detailed inventories of traditional cultural places and site specific impact analyses will be compiled for the selected route in conjunction with similar follow-up surveys for archaeological and historical sites. Measures to avoid or mitigate direct impacts will be explored in accordance with the programmatic agreement negotiated in compliance with Section 106 of the NHPA.

ALTERNATIVES

Eastern Area Transmission Line Alternatives

The characteristics of the cultural resources along the eastern area alternative routes are summarized in Table 3-7 and on Figures MV-14E, MV-15E, MV-16E, and MV-18E.

Glen Canyon 1 (GC1)

New Mexico

Archaeological and Historical Sites—This section of GC1, which is approximately 35 miles long, crosses the Chuska Valley. This route across the valley is generally rated as having high sensitivity for archaeological and historical sites, except for a 15-mile segment of Link 460 across badlands of Mancos shale, which is rated as having low sensitivity.

TABLE 3-7
SUMMARY OF CULTURAL RESOURCES ALONG THE EASTERN ALTERNATIVE ROUTES

Resource Type	New Mexico	Arizona	Total
Glen Canyon 1 (GC1)			
Archaeological and Historical Sites	20 miles high sensitivity 15 miles low sensitivity	56 miles high sensitivity 113 miles moderate sensitivity 57 miles low sensitivity	76 miles high 113 miles moderate 72 miles low
Special Status Cultural Resources		Cameron Bridge (high sensitivity)	Cameron Bridge (high sensitivity)
Traditional Navajo Cultural Places	25 miles high sensitivity 10 miles moderate sensitivity	29 miles high sensitivity 197 miles moderate sensitivity	54 miles high 207 miles moderate
Traditional Hopi Cultural Places	28 miles low sensitivity (reflects lack of data, not necessarily lack of resources)	114 miles high sensitivity 15 miles moderate sensitivity 97 miles low sensitivity (48 ritual places; 12 nonritual places)	48 ritual places 12 nonritual places
Kaibito 1 (K1)			
Archaeological and Historical Sites	20 miles high sensitivity 15 miles low sensitivity	56 miles high sensitivity 97 miles moderate sensitivity 57 miles low sensitivity	76 miles high 97 miles moderate 72 miles low
Special Status Cultural Resources		Cameron Bridge (high sensitivity)	Cameron Bridge (high sensitivity)
Traditional Navajo Cultural Places	25 miles high sensitivity 10 miles moderate sensitivity	29 miles high sensitivity 181 miles moderate sensitivity	54 miles high 191 miles moderate
Traditional Hopi Cultural Places	28 miles low sensitivity (reflects lack of data, not necessarily lack of resources)	99 miles high sensitivity 16 miles moderate sensitivity 95 miles low sensitivity (44 ritual places; 11 nonritual places)	44 ritual places 13 nonritual places
Central 1 (C1)			
Archaeological and Historical Sites	40 miles high sensitivity	37 miles high sensitivity 104 miles moderate sensitivity 6 miles low sensitivity	77 miles high 104 miles moderate 6 miles low

TABLE 3-7
SUMMARY OF CULTURAL RESOURCES ALONG THE EASTERN ALTERNATIVE ROUTES

Resource Type	New Mexico	Arizona	Total
Special Status Cultural Resources	Pictured Cliffs Site Mitten Rock District (high-moderate sensitivity)	Taawa Hopi Tribal Park Cameron Bridge (high sensitivity)	Pictured Cliffs Mitten Rock District Taawa Tribal Park Cameron Bridge
Traditional Navajo Cultural Places	21 miles high sensitivity 19 miles moderate sensitivity	70 miles high sensitivity 77 miles moderate sensitivity	91 miles high 96 miles moderate
Traditional Hopi Cultural Places	24 miles high sensitivity (reflects lack of data, not necessarily lack of resources)	147 miles high sensitivity (64 ritual places) (5 nonritual places)	64 ritual places 5 nonritual places
Central 2 (C2)			
Archaeological and Historical Sites	20 miles high sensitivity 15 miles low sensitivity	7 miles high sensitivity 154 miles moderate sensitivity 15 miles low sensitivity	27 miles high 154 miles moderate 30 miles low
Special Status Cultural Resources		Hopi Taawa Tribal Park Cameron Bridge (high sensitivity)	Hopi Taawa Park Cameron Bridge
Traditional Navajo Cultural Places	25 miles high sensitivity 10 miles moderate sensitivity	63 miles high sensitivity 113 miles moderate sensitivity	88 miles high 123 miles moderate
Traditional Hopi Cultural Places	28 miles high sensitivity (reflects lack of data, not necessarily lack of resources)	162 miles high sensitivity 14 miles low sensitivity (66 ritual places) (4 nonritual places)	66 ritual places 4 nonritual places

NOTE: Distances have been rounded to nearest mile.

Special Status Cultural Resources—There are no special status cultural resources along the New Mexico segment of GC1.

Traditional Cultural Places—Traditional Navajo cultural places along GC1 are rated as having high sensitivity for about 25 miles, and moderate sensitivity for about 10 miles. About 28 miles of Link 460 are in New Mexico. This unit is rated as having low sensitivity for traditional Hopi cultural places, although no specific resources have been identified. This rating reflects lack of available data, not necessarily a lack of resources or Hopi interest in the area.

Arizona

Archaeological and Historical Sites—Environmental subregions crossed by the east-west portion of GC1 are identified as the Gothic Mesas, Chinle Valley, the border area between the north end of Black Mesa and the southern edge of the Tsegi Mesas, Shonto Plateau, and the Kaibito Plateau. These subregions are characterized as a mixture of primarily moderate to high sensitivity zones for archaeological and historical sites. The north-south portion of GC1 crosses the Kaibito Plateau and the Painted Desert subregions, which are characterized primarily as having moderate and low sensitivities for archaeological and historical sites. The GC1 alternative has approximately 56 miles rated as having high sensitivity, 113 as moderate, and 57 as low.

Special Status Cultural Resources—Only one special status cultural resource is located along GC1—a bridge over the Little Colorado River at Cameron (Link 1386). This bridge is listed on the National Register of Historic Places, and is rated as having high sensitivity.

Traditional Cultural Places—Approximately 29 miles are rated as highly sensitive for traditional Navajo cultural places, and the other 197 miles are rated as moderately sensitive. The highest sensitivities are in the Marsh Pass area on the northern end of Black Mesa. Links totaling about 114 miles are rated as having high sensitivity for Hopi traditional places, about 15 miles as moderate sensitivity, and 97 miles as low sensitivity. This reflects a total of 48 known traditional Hopi places associated with rituals within a six-mile-wide corridor, and another 12 nonritual traditional use areas. The highest sensitivity areas are scattered along the east-west portion of GC1.

Kaibito 1 (K1)

New Mexico

The New Mexico portion of K1 is the same as GC1.

Arizona

The Arizona portion of K1 is the same as GC1 except for the use of Links 1390 and 1391 across the Kaibito Plateau (which replace Links 587, 620, 621, 627, and 1389 on GC1).

Archaeological and Historical Sites—K1 crosses approximately 20 miles of moderate sensitivity zones.

Special Status Cultural Resources—No special status cultural resources are located along K1.

Traditional Cultural Places—K1 crosses about 20 miles of moderate sensitivity zones for traditional Navajo cultural places. Approximately two miles of the corridor are characterized as having moderate sensitivity for traditional Hopi cultural places, and the remainder is rated as a low sensitivity zone. One known Hopi nonritual traditional use area was identified.

Central 1 (C1)

New Mexico

Archaeological and Historical Sites—This section of C1 stretches approximately 40 miles across the Chuska Valley, which is rated as having high sensitivity for archaeological and historical sites.

Special Status Cultural Resources—Two special status cultural resources located along C1 are the Pictured Cliffs site, a petroglyph (rock art) locality, and the Mitten Rock Archaeological District. Both are listed on the New Mexico Register of Cultural Properties. [The Hogback Chaco protection site also is about three miles from the C1 reference centerline, but is screened by The Hogback.]

Traditional Cultural Places—Traditional Navajo cultural places along C1 are rated as having high sensitivity for 21 miles and moderate sensitivity for 19 miles. No known traditional Hopi places were identified in New Mexico, but Link 700, extending about 24 miles into New Mexico, is rated as having high sensitivity. This reflects lack of available data and not necessarily a lack of resources or Hopi interest in the area.

Arizona

Archaeological and Historical Sites—C1 crosses the Colorado Plateau and environmental subregions identified as the Chuska Mountains, Defiance Plateau, Chinle Valley, Black Mesa, Tusayan Washes, Moenkopi Plateau and the Painted Desert. The eastern subregions are characterized as high sensitivity zones, the central subregions as moderate sensitivity zones, and the western Painted Desert subregion as a low sensitivity zone, except for the crossing of the Little Colorado River, which is rated as high. A total of 37 miles are rated as highly sensitive, 104 miles as moderately sensitive, and 6 miles as a low sensitivity zone for archaeological and historical sites.

Special Status Cultural Resources—Two special status cultural resources are located along C1 (Link 780). They are the Hopi Taawa tribal park, which has been defined to protect a group of petroglyphs northwest of Third Mesa, and the Cameron Bridge, which is listed on the National Register of Historic Places.

Traditional Cultural Places—Traditional Navajo cultural places along the route are rated as highly sensitive for approximately 70 miles and as moderately sensitive for 77 miles, with the highest sensitivities in the Chuska Mountains and on Black Mesa. The entire length of the Arizona segment of C1 is rated as a high sensitivity zone for traditional Hopi places. This reflects a total of 64 known traditional Hopi ritual places and five nonritual traditional use areas within a six-mile-wide study corridor.

Central 2 (C2)

New Mexico

The New Mexico portion of C2 is the same as GC1 and K1.

Arizona

The Arizona portion of C2 varies from C1 by passing to the north and west of the Chuska Mountains along Link 460 near Teec Nos Pos and Link 462 in the Chinle Valley and across Carson Mesa. The portion of C2 from the Lohali Mesa area west to the Moenkopi Substation along Link 780 is the same as C1.

Archaeological and Historical Sites—All of Link 462 is characterized as a moderate sensitivity zone.

Special Status Cultural Resources—No special status cultural resources are located along Link 462.

Traditional Cultural Places—Link 462 is rated as a moderate sensitivity zone for traditional Navajo cultural places, and as a high sensitivity zone for traditional Hopi cultural places. Eight known Hopi ritual places are located along Link 462.

Substation Alternatives

Shiprock Substation—Only one prior cultural resource survey along a linear transect is documented within the immediate vicinity, and no archaeological or historical sites were found. However, several sites have been recorded in the general vicinity and the existing substation is situated within an area characterized as having high sensitivity for archaeological and historical sites. Several archaeological or historical sites could be expected within the expansion area. Pictured Cliffs, a petroglyph site listed on the New Mexico Register of Cultural Properties, is the closest special status cultural resource, but it is located about three miles to the southeast. The region is characterized as having low to moderate sensitivity for traditional Navajo cultural places. No traditional Hopi cultural sensitivity is projected, but this reflects lack of available data and not necessarily a lack of resources or Hopi interest.

Honey Draw, Red Mesa, and Copper Mine Substation Sites—The site is situated on the Kaibito Plateau, which is generally characterized as having moderate sensitivity for archaeological and historical sites. No cultural resource surveys have been conducted within the area. Archaeological or historical sites could be present, but are unlikely to be very large or complex. There are no special status cultural resources in the vicinity of the site. The region is characterized as having moderate sensitivity for traditional Navajo cultural places, and generally high sensitivity for traditional Hopi cultural places.

Moenkopi Substation—Four archaeological sites were recorded in the vicinity of the Moenkopi Substation prior to the original construction of the facility, and excavations were conducted at two of the sites. Four hearth features were found at one of the excavated scatters of lithic artifacts; the other site

yielded no subsurface features or deposits. In general, the substation is situated within an area characterized as having low to moderate sensitivity for archaeological and historical sites. A few archaeological or historical sites could be present, but are unlikely to be very large or complex. The Cameron Bridge, which is listed on the National Register of Historic Places, is the closest special status cultural resource, but it is located about four miles to the northeast. The region is characterized as having moderate sensitivity for traditional Navajo and high sensitivity for traditional Hopi cultural places.

Western Area Transmission Line Alternatives - Moenkopi to Marketplace

The characteristics of the cultural resources along the western area alternative routes are summarized in Table 3-8 and on Figures MV-14W through MV-18W, and described in the following sections.

TABLE 3-8
SUMMARY OF CULTURAL RESOURCES ALONG THE WESTERN ALTERNATIVE ROUTES

Resource Type	Arizona	Nevada	Total
Northern 1 West (N1W) (Moenkopi to Marketplace)			
Archaeological and Historical Sites	90 miles moderate sensitivity 97 miles low sensitivity	30 miles low sensitivity	90 miles moderate 127 miles low
Special Status Cultural Resources	Moqui Stage Station		Moqui Stage Station
Traditional Navajo Cultural Places	16 miles high sensitivity 68 miles moderate sensitivity 7 miles low sensitivity		16 miles high 68 miles moderate 7 miles low
Traditional Hopi Cultural Places	24 miles high sensitivity 67 miles moderate sensitivity 96 miles low sensitivity (1 ritual place) (1 nonritual trail)	13 miles low sensitivity	1 ritual place 1 nonritual trail
Traditional Hualapai Cultural Places	60 miles high sensitivity 103 miles moderate sensitivity	13 miles moderate sensitivity	60 miles high 116 miles moderate
Northern 2 (N2) (Moenkopi to Marketplace)			
Archaeological and Historical Sites	37 miles moderate sensitivity 158 miles low sensitivity	30 miles low sensitivity	37 miles moderate 188 miles low
Special Status Cultural Resources	Route 66 (2 locations) Beale Road Moqui Stage Station Wright Canyon ACEC		Route 66 (2 locations) Beale Road Moqui Stage Station Wright Canyon ACEC
Traditional Navajo Cultural Places	16 miles high sensitivity 68 miles moderate sensitivity 7 miles low sensitivity		16 miles high sensitivity 68 miles moderate sensitivity 7 miles low sensitivity

TABLE 3-8
SUMMARY OF CULTURAL RESOURCES ALONG THE WESTERN ALTERNATIVE ROUTES

Resource Type	Arizona	Nevada	Total
Traditional Hopi Cultural Places	24 miles high sensitivity 67 miles moderate sensitivity 104 miles low sensitivity (1 ritual place) (1 nonritual trail)	13 miles low sensitivity	1 ritual place 1 nonritual trail
Traditional Hualapai Cultural Places	50 miles high sensitivity 121 miles moderate sensitivity	13 miles moderate sensitivity	50 miles high sensitivity 134 miles moderate sensitivity
Southern 2 (S2) (Moenkopi to Marketplace)			
Archaeological and Historical Sites	60 miles moderate sensitivity 158 miles low sensitivity	30 miles low sensitivity	60 miles moderate 188 miles low
Special Status Cultural Resources	Wupatki National Monument Route 66 (2 locations) Beale Wagon Road (3 locations) Wright Canyon ACEC		Route 66 (2 locations) Beale Wagon Road (3 locations) Wright Canyon ACEC
Traditional Navajo Cultural Places	20 miles high sensitivity 28 miles moderate sensitivity		20 miles high 28 miles moderate
Traditional Hopi Cultural Places	19 miles high sensitivity 13 moderate sensitivity 187 low sensitivity (2 ritual places) (1 nonritual trail)	13 miles low sensitivity	2 ritual places 1 nonritual trail
Traditional Hualapai Cultural Places	82 miles high sensitivity 66 miles moderate sensitivity	13 miles moderate sensitivity	82 miles high 79 miles moderate
Northern 3 (N3) (Moenkopi to Mead)			
Archaeological and Historical Sites	90 miles moderate sensitivity 99 miles low sensitivity	11 miles low sensitivity	90 miles moderate sensitivity 110 miles low sensitivity
Special Status Cultural Resources	Moqui Stage Station Willow Beach Gauging Station		Moqui Stage Station Willow Beach Gauging Station
Traditional Navajo Cultural Places	16 miles high sensitivity 68 miles moderate sensitivity 7 miles low sensitivity		16 miles high sensitivity 68 miles moderate sensitivity 7 miles low sensitivity

TABLE 3-8
SUMMARY OF CULTURAL RESOURCES ALONG THE WESTERN ALTERNATIVE ROUTES

Resource Type	Arizona	Nevada	Total
Traditional Hopi Cultural Places	24 miles high sensitivity 67 miles moderate sensitivity 97 miles low sensitivity (1 ritual place) (1 nonritual trail)	11 miles low sensitivity	1 ritual place 1 nonritual trail
Traditional Hualapai Cultural Places	60 miles high sensitivity 104 miles moderate sensitivity	11 miles moderate sensitivity	60 miles high 114 miles moderate
Northern 4 (N4) (Moenkopi to Mead)			
Archaeological and Historical Sites	37 miles moderate sensitivity 159 miles low sensitivity	11 miles low sensitivity	37 moderate 170 miles low
Special Status Cultural Resources	Moqui Stage Station Route 66 (2 locations) Beale Wagon Road Willow Beach Gauging Station Wright Canyon ACEC		Moqui Stage Station Route 66 (2 locations) Beale Wagon Road Willow Beach Gauging Station Wright Canyon ACEC
Traditional Navajo Cultural Places	16 miles high sensitivity 68 miles moderate sensitivity 7 miles low sensitivity		16 miles high sensitivity 68 miles moderate sensitivity 7 miles low sensitivity
Traditional Hopi Cultural Places	24 miles low sensitivity 67 moderate sensitivity 105 low sensitivity (1 ritual place) (1 nonritual trail)	11 miles low sensitivity	1 ritual place 1 nonritual trail
Traditional Hualapai Cultural Places	50 miles high sensitivity 123 miles moderate sensitivity	11 miles moderate sensitivity	50 miles high 133 miles moderate
Southern 4 (S4) (Moenkopi to Mead)			
Archaeological and Historical Sites	60 miles moderate sensitivity 159 miles low sensitivity	11 miles low sensitivity	60 miles moderate 170 miles low
Special Status Cultural Resources	Wupatki National Monument Route 66 (2 locations) Beale Wagon Road (3 locations) Willow Beach Gauging Station Wright Canyon ACEC		Route 66 (2 locations) Beale Wagon Road (3 locations) Willow Beach Gauging Station Wright Canyon ACEC

TABLE 3-8
SUMMARY OF CULTURAL RESOURCES ALONG THE WESTERN ALTERNATIVE ROUTES

Resource Type	Arizona	Nevada	Total
Traditional Navajo Cultural Places	20 miles high sensitivity 28 miles moderate sensitivity		20 miles high 28 miles moderate
Traditional Hopi Cultural Places	19 miles high sensitivity 13 miles moderate sensitivity 188 miles low sensitivity (2 ritual places) (1 nonritual trail)	11 miles low sensitivity	2 ritual places 1 nonritual trail
Traditional Hualapai Cultural Places	82 miles high sensitivity 67 miles moderate sensitivity	11 miles moderate sensitivity	82 miles high 78 miles moderate

NOTE: Distances have been rounded to nearest mile.

Northern 1 West (N1W)

Arizona

Archaeological and Historical Sites—N1W crosses environmental subregions identified as the Painted Desert, Coconino Plateau, Transition Zone, and the Basin and Range Province. The eastern subregions are generally characterized as moderate sensitivity zones for archaeological and historical sites, along with the section across the plateau at the southern end of the Hualapai Reservation. Sensitivities decline to low levels to the west. A total of 90 miles are rated moderately sensitive, and 97 miles are rated as low sensitivity zones for archaeological and historical sites.

Special Status Cultural Resources—The only special status cultural resource located along N1W is the Moqui Stage Station site. Interpretative signs have been installed by the Kaibab National Forest in conjunction with development of the Arizona Trail.

Traditional Cultural Places—Traditional Hualapai cultural places are rated as highly sensitive for 60 miles, and moderately sensitive for 103 miles of the Arizona section. Traditional Navajo cultural places along the route are rated as highly sensitive for 16 miles, moderate for 68 miles, and low for 7 miles. Traditional Hopi places are rated as having high sensitivity for 24 miles, moderate for 67 miles, and low for 96 miles. This reflects a single known traditional Hopi ritual place and one traditional trail within a six-mile-wide study corridor.

Nevada

Archaeological and Historical Sites—N1W is confined to the environmental subregion identified as the Basin and Range Province. The specific physiographic features crossed by N1W are the Eldorado

Mountains and the Eldorado Valley, which are characterized as low sensitivity zones for archaeological and historical sites.

Special Status Cultural Resources—No special status cultural resources are located along this portion of N1W.

Traditional Cultural Places—Thirteen miles of Link 2060 are characterized as having moderate sensitivity for traditional Hualapai cultural places, and low sensitivity for traditional Hopi cultural places.

Northern 2 (N2)

Arizona

The Arizona portion of N2 is the same as N1W with the exception of Links 1742, 1800, 1980, and 2020, which are located to the south of the Hualapai Reservation and replace Link 1790 on N1W.

Archaeological and Historical Sites—The section of N2 that diverges from N1W and descends from the Hualapai Plateau down onto the Truxton Plain crosses about 60 miles rated as having low sensitivity for archaeological and historical sites.

Special Status Cultural Resources—This section of N2 includes the Beale Wagon Road, U.S. Route 66 at two locations, and the Wright Canyon ACEC. The Beale Wagon Road was surveyed and constructed in 1857-1859 and was a popular immigrant trail during the 1860s and 1870s prior to the construction of railroads. Land-managing agencies have identified and developed parts of this route as a historic recreational trail. U.S. Route 66 has been designated as a historic road, and NPS has studied the highway for possible incorporation or affiliation with the National Park system. The Wright Canyon ACEC is designated primarily for riparian steam values, but has associated archaeological sites.

Traditional Cultural Places—About 42 miles of the Truxton Plain section of N2 are characterized as high sensitivity zones for traditional Hualapai cultural places and about 19 miles are rated as moderately sensitive. Sensitivities for traditional Hopi cultural places are rated as low for this entire section.

Nevada

The Nevada portion of N2 is the same as N1W.

Southern 2 (S2)

Arizona

In Arizona, S2 varies from N2 beginning at the Moenkopi Substation and continuing through Link 2006. At this point, S2 is then the same as N2 proceeding north and west along Links 2020 and 2060 to the crossing of the Colorado River and the Nevada border.

Archaeological and Historical Sites—This section of S2 crosses about 60 miles rated as having moderate sensitivity and 103 miles as low sensitivity.

Special Status Cultural Resources—The Beale Wagon Road is crossed in three locations, U.S. Route 66 is crossed in two locations, and the Wright Canyon ACEC is passed by S2 (all in different locations than N2). In addition, S2 is likely to be visible from portions of Wupatki National Monument, although the line would be about 10 miles or more from the monument boundary.

Traditional Cultural Places—About 82 miles of the eastern section of S2 that varies from N2 are characterized as high sensitivity zones for traditional Hualapai cultural places and about 12 miles are rated as moderately sensitive. Sensitivities for traditional Navajo cultural places are rated as high for about 20 miles and moderate for about 28 miles. Sensitivities for traditional Hopi cultural places are rated as high for about 19 miles, moderate for about 13 miles, and low for about 132 miles. Two known Hopi traditional ritual places and a trail are located along this section of S2.

Nevada

The Nevada portion of the S2 route is the same as N1W and N2 routes.

Western Area Transmission Line Alternatives - Moenkopi to Mead

Northern 3 (N3), Northern 4 (N4), and Southern 4 (S4)

Alternatives N3, N4, and S4 are identical to alternatives N1W, N2, and S2, respectively, with the exception of Links 2040 and 2080, which connect into the Mead Substation rather than the Marketplace Substation (replacing Links 2060, 2200, and 2180). The following description focuses on Links 2040 and 2080.

Arizona and Nevada

Archaeological and Historical Sites, Special Status Cultural Resources, and Traditional Cultural Places—In general, the cultural resource sensitivities are very similar to the N1W, N2, S2 western segment into Marketplace.

This segment crosses areas rated as low sensitivity zones for archaeological and historical sites. The Willow Beach Gauging Station, which is listed on the National Register of Historic Places, is located within the six-mile-wide study corridor along this segment. This historic facility was used to measure the flows of the Colorado River.

Sensitivities for traditional Hualapai cultural places are rated as moderate along portions of the alternative route. This segment crosses about 48 miles of these moderate sensitivity zones. There are no traditional Navajo cultural places and Hopi sensitivities are rated only as low.

Substation Alternatives

Red Lake Substation Site—Two previous linear surveys have been conducted near the site, but neither recorded any archaeological resources in the vicinity of the site. The site is within a portion of a mountain environmental zone that is projected to have moderate sensitivity for archaeological and historical sites. This suggests that a few such sites might be present within the substation area, but they are unlikely to be very large or complex.

The closest special status resource is the Beale Wagon Road, which is located on the opposite side of State Route 64 about one mile to the west of the substation site. The road is not well preserved in this section. Laws Spring, a National Register listed camp site along the Beale Wagon Road, is located almost six miles to the southeast.

The alternative route that connects with the substation site is rated as having medium and high sensitivities for traditional Navajo cultural places. Traditional Hopi cultural place sensitivities are rated as low, and no traditional Hualapai cultural place sensitivities are identified.

Marketplace Substation—A cultural resource survey conducted for development of the Marketplace Substation (then referred to as McCullough II) resulted in the discovery of only four isolated finds and one small lithic scatter, all of which were determined to be insignificant. No special status cultural resources are present in the vicinity of the substation, and no traditional cultural places have been identified in the area.

Mead Substation—Prior cultural resource surveys along transmission lines connecting to the existing substation have recorded only a single isolated artifact in the vicinity of the substation. The general area is characterized as having low sensitivity for archaeological and historical sites. No special status cultural resources are present in the vicinity of the substation, and no traditional cultural places have been identified in the immediate area.

Microwave Communication Facility

No archaeological and historical sites or special status cultural places have been identified in the vicinity of the existing facility. Bill Williams Peak is named in Navajo ceremonial stories, and traditional Hopi places are located on the mountain, but not within the existing communications site.